MORELL'S
HAND-BOOK
OF
LOGIC.
HANDBOOK OF LOGIC.

ADAPTED SPECIALLY

FOR THE USE OF SCHOOLS AND TEACHERS.

BY

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PREFACE.

There can be no doubt, I think, that the whole system of English Education has hitherto been greatly wanting in the sound development of the powers of abstract thinking. The proper road, nevertheless, to the cultivation of these powers appears to me to be very simple. The natural introduction into the whole region of the abstract, is undoubtedly an intelligent study of grammar: for grammar is the science of language, and language shows the natural mode in which we generalise our sensations and ideas. After the principles of grammar have been well understood, the laws of thought, which are spontaneously involved in language, should be studied more scientifically: and to do this we want a simple introduction to Logic. After Logic, the next step should be an elementary treatise on the human mind, viewed in relation both to the teacher and the taught.

This, then, is the plan of an elementary discipline which has been for some time before my mind, and which I have now partly realised. The "Essentials of English Grammar" was intended to be a simple introduction to the study of grammar generally; and, consequently, is adapted rather to explain principles, than to enter into all the minutiae of the English Language. Next, "The Analysis of Sentences" was intended to go somewhat further than English Grammar ordinarily has done, in this country, into the general structure of language, as an organ of thought. This end, I trust, it has accomplished; and I am pleased here to record my satisfaction at the large amount of interest which has already become manifested in the method of study there expounded.
I now offer the present little work as one further contribution to my general plan. The object of a brief course of Logic is, to exercise the intellectual faculties, to accustom them to abstract processes, and to give some idea of the general laws of thought. In doing so, I have followed, with the exception of the introduction, the usual Aristotelian road; believing, as I do, that even if the system of Aristotle be capable of great simplification (which no doubt it is), yet there will be both a good exercise of the intellect, as well as some historical interest, in treading along this old path, which was so diligently beaten by our forefathers in the middle ages. The mode of presenting the subject however will, I hope, be found here much simplified. As to the illustrations and exercises, I have partly made them myself, and partly culled them from other books on Formal Logic. The student will find, in going steadily through this Handbook, every thing essential to the subject; but if his curiosity leads him to go a little further in the same direction, he might study Archbishop Whately's excellent treatise, and then the Port Royal Logic, as translated by Mr. Baynes of Edinburgh. At any rate I should strongly recommend every student to work all the exercises given at the end of the book, as he proceeds; for it is only by making such attempts for himself, that he can possibly derive much mental discipline from the study of the subject.

If I can spare sufficient time from my official duties, I hope, one of these days, to complete my plan in the form of an Elementary Psychology, viewed expressly in reference to Education.

J. D. MORELL.

June, 1857.
PRELIMINARY EXPLANATIONS.

1. All our knowledge begins, in the order of time, with the exercise of the senses. When any part of the nervous system is affected, and a feeling is produced, of which the mind is conscious, such feeling is termed a sensation. Sensation does not imply any knowledge of the external object affecting us,—not even of its existence; it is confined wholly to the consciousness of the internal impression.

2. If our mental life consisted merely in the consciousness of successive impressions, there would be no unity or connexion in it. Very soon, accordingly, in the order of the mind's growth, the sensations experienced begin to cluster round a central point to which they all alike stand related. This central point we term self-consciousness;—it is the instinctive feeling we possess, that all our sensational impressions belong to one subject, which we afterwards term self, or the me.

3. With the rise of self-consciousness there is developed, contemporaneously, the consciousness of an
external world,—of its primary qualities, and its perpetual changes. This power, which the mind possesses, of passing from the inward feeling to the external object producing it, is termed *Perception*.

The *neuter* verb "I feel" (strangely), corresponds with a *sensation*; the *active* verb "I feel" (the table), corresponds with an act of perception.

4.

Perception,—or as it is sometimes termed *intuition*, —is the primary form of human knowledge, that which arises from the first direct action of the world without upon the mental faculties. It is by perception or intuition, that we come to know the properties of matter as they exist in *time* and *space*—extension, size, resistance, motion, &c.; and it is by a similar intuitive process, that on the presentation of the proper external conditions, we experience the *first elementary consciousness* of beauty, proportion, harmony, right, and reverence.

All the elements of human knowledge, in fact, exist primarily in the form of *intuition*, before they are brought into a more definite state by the processes we have yet to explain.

5.

The very same effort which leads the mind to perceive objects external to itself, leads it also to grasp them with the greatest possible degree of clearness. This effort is called *attention*.

In directing our attention to an outward phenomenon, we pass by the minor points, and seizing naturally upon the most striking features of it, retain them with more than ordinary distinctness before our view. Thus the mind, by virtue of its own activity, *constructs* a new and peculiar aspect of this phenomenon, and by so doing prepares the way, as we shall see, for another very important process in our mental history.
6.

The more free and active the mind is in performing any operation, the more permanent is the result. In sensation the mind is least free (or spontaneous); and consequently we cannot recall a purely sensational impression with any thing approaching its original intensity. In perception the mind is more free than in sensation; and consequently our intuitions can be much more perfectly reproduced than our sensations. When, however, the mind has had its attention energetically directed to a phenomenon, when it has seized upon the prominent features and constructed a peculiar point of view for itself, the idea of it thus formed may return with almost the same vividness, with which it was first experienced in the presence of the object itself. This reproduction we term Memory.

7.

In sensation we experience internally a feeling produced by some affection of the nervous system. In perception we interpret this feeling, and attribute it to the object with which we stand, as it were, face to face. In attention, we idealise this object by letting the unimportant features disappear, and by seizing the more prominent points of view. Lastly, in memory we repeat this act of attention when the object is no longer present, and thus make an internal representation of it to ourselves. This we term a Representative Idea.

8.

When we store up a number of these ideas in the mind, disconnect them from the external phenomena, from which they first took their rise, and then recombine them into new forms or images, we are said to be exercising the imagination. The order in which the ideas come and go (the one calling up or suggesting the other), depends upon what are termed the Laws of Association.
All the processes we have hitherto described may go on without the aid of Language. Our intuitions are felt or experienced internally, but they can never be adequately expressed. No words can convey to any one the full realisation of an object which he has never seen. For the same reason memory and imagination (as dealing with the elements of our actual experiences) lie partially beyond the range of language also. In consequence of this the mental images we experience in the processes of memory and imagination, are indefinite and variable,—merging often, like dissolving views, one into the other, just as we often realise them in our dreams. It is only when they are embodied in an external sign, that they first become fixed, are held clearly apart, and are thus raised above the fluctuations of our inward and more individual experiences.

When the mind has once created Language, as the objective embodiment of its ideas, it possesses an organ by means of which it can proceed to a range of far higher intellectual processes than would have been possible without it. Every object which we contemplate externally presents to us a cluster of qualities, constituting the entire phenomenon that we term a thing. We have already seen, that in the process of attention, the minor features of such phenomena disappear, so that we grasp only the more prominent points. Now it may so happen, that a great number of different things all agree in alike possessing these prominent features, on which the attention has become fixed.

Thus all the different kinds of trees are alike distinguished by the possession of trunk, branches, leaves, roots, &c., however different in other respects.

Passing by, therefore, their numerous differences, we
find that they all unite in one general representation. If the general representation then be in each case fixed, and designated by a sign, it will soon become evident that the very same term may be equally well applied to a great number of individual existences; that it will express what is alike essential to them all; and that it may be henceforth used as the common sign for the entire class. This process is termed Generalisation.

11.

By a slight variation of the process, we may separate any given quality from a number of different objects. This quality, when thus separated, viewed apart from the several objects to which it belongs, and fixed by a term, becomes what we call an abstract idea. The process of forming it is then called Abstraction.

12.

Having arrived, then, so far, the mind can banish, at will, the whole concrete world, with its various images and impulses, from the consciousness, and occupy itself for a time only with abstractions and generalisations as exhibited in words. The mental faculty which deals thus with abstract and general ideas, fixes their precise meaning, ranges them one over the other in the order of their generality, classifies our knowledge under them into definite heads, forms them into propositions, and draws conclusions from one set of propositions to another, is called the Understanding.

13.

The Understanding proceeds according to certain fixed laws, termed the laws of Thought. The region of our intuitions and of our representative ideas is not pervaded by any fixed and absolute laws whatever. Much depends in their case on the peculiar constitution of the individual mind, and the circumstances in which it is placed. The succession of our ideas and the com-
bination of them into new forms is, we know, to great extent arbitrary. Once, however, project the images out of ourselves,—objectify them—emboss them in terms which are adequately defined by the relation to other terms, and the whole process becomes subject to definite laws, which the mind is constrained to look upon as absolute.

14.

The absoluteness of the laws of thought flows from the very nature of the processes of abstraction and generalisation. In a pure generalisation we sink a reference to the intuitions out of which it has been elaborated, and consider the designating term only in reference to the other terms which it includes under. Thus the word Eagle is used in Natural History to designate a certain class of birds, including some and excluding others. The meaning of it is wholly determined by the enumeration of certain qualities. The abstract idea therefore conveyed by the term Eagle is definitely fixed by the understanding, though we may have no experience whatever of the thing itself. An every general term, in like manner, looked at apart from any actual experience of the thing, must be reckoned as a sign standing in a given quantitative relation to other signs.

To investigate these relations is simply performing a species of calculation, with words as our cipher. Language gives us the ciphers ready formed, and has already partially determined, by use, how they should stand in the order of generality. All we have to do, then, is to calculate the precise relations, we may require to know as existing between any two or more terms, that language supplies, and thus to make the perfectly clear to our comprehension. In this way our knowledge, so far as it reaches, is rendered precise, definite, and explicit. The fixed principles according to which we are necessarily led to classify our know
ledge *in the order of generality*, and carry on all communication between mind and mind through the means of ideas thus arranged, are what we mean by the laws of thought.

15.

*The purport of Logic, then, is to investigate these fixed laws of thought; to show us the principles by which our understanding is governed; and to guard us in this way against all possible fallacies in reasoning.*

The above psychological explanations give us a clear determination of the real province of Logic properly so called. They show us —

1. That Logic has to do only with the *formal* laws of thinking; and takes no cognisance of the truth or falseshood of the ideas themselves.

2. That Logic only investigates the laws of thoughts as embodied and represented in *language*; for it is only by means of language that the understanding, properly so called, can operate *at all*. Hence the philosophic truthfulness of the *double meaning* attached to the Greek term ἴδιος.

3. That Logic is a *science* and not an *art*; investigating a system of fixed laws; and thus influencing the mind as a *discipline*, rather than teaching it a *craft*.

4. That Logic is the most *abstract* of the Sciences; as having nothing to do with the *matter*, but only with the *forms* of our thoughts.

16.

**DIVISION OF THE SUBJECT.**

Our exposition of the subject will fall under four heads.

I. On Concepts and Terms.

II. On Propositions.

III. On Reasoning.

IV. On Fallacies.
I. ON CONCEPTS AND TERMS.

17.

It has been already shown that the laws of thought all flow from the very nature of the processes of abstraction and generalisation. When an abstract or a generalised idea has been formed in the mind, we call it a Concept; and when expressed by an outward sign, we call it a Term. Our next duty, then, will be to explain what Logic has to teach us in reference to concepts; since much will henceforth depend upon a proper understanding of them.

This branch of Logic has been usually termed, the doctrine of simple apprehension. This expression, we consider, is open to objection. We apprehend things in various ways—by perception, by the imagination, by the reason, etc., whereas in Logic we have only to do with the apprehension of generalised and abstract ideas in the understanding. The word concept exactly answers to this latter signification;—it is a single idea in which a number of particulars are held together. The expression, moreover, was often used by the old English writers, only written conceit instead of concept; and it has more recently been brought anew into use by Sir W. Hamilton.

18.

THE ORIGIN AND NATURE OF CONCEPTS.

This has been partly explained already in describing the processes of abstraction and generalisation. The mind, we will suppose, has stored up a vast variety of images, or ideas, formed from its actual perceptions. Amongst these ideas, it finds a number, which possess certain resemblances to each other. By confining our attention to these points of resemblance, and neglecting every thing else, we form one general idea, which includes in it all the given individuals. This general idea is what we term a concept; which, it will be seen, is merely an ideal whole formed in order the more conveniently to classify our knowledge; i.e. to gather up the details of it under certain general heads.
The function of a concept, therefore, is to give us not a full, but only a partial or inadequate knowledge of the things to which it relates. It is indicated by a mark or sign, which designates indeed a certain number of individuals, but does so only in so far as they agree in some common point of resemblance. It exists, therefore, as a unity, only in thought, and not at all in nature.

For Example. We gain by perception a great number of experiences respecting Birds, of all sizes, shapes, and colours. In all these experiences we seize upon a certain common resemblance—and designate the general idea thus formed by the term Bird.

Bird, therefore, as thought by us, is a concept, holding within its meaning a certain number of individuals; or, regarded verbally, it is a mark, connoting certain other marks with it.

It is also a purely ideal creation, having nothing answering to it in nature, as a whole; but is simply created by the mind out of the different experiences, to which it has a common reference.

Once more, it conveys only an inadequate knowledge of the things themselves; for it marks only the common property of Birds, and neglects all the other details respecting them.

Its use is finally to classify our knowledge, and prevent the necessity of infinite detail in the employment of terms, and in the expression of our thoughts.

19.

CLASSIFICATION OF TERMS.

Terms are divided into two great classes, the one called singular, the other universal.

A singular term is one which is applied only to one thing; that is, which only marks an individual: as, Julius Cæsar; the Queen of England. Such a term is really abstract in its character, since it does not mark any one given experience, but denotes a general idea of the individual object, formed out of all the detailed experiences which we have had respecting it.

A universal term is one which can be applied to
several things in the same sense: as, man; horse; tree.

Various other classifications of abstract terms have been made which are not of sufficient importance to the science of Logic to claim any special attention.

Thus, terms have been divided into
1. Substantives = Nouns.
2. Attributives = Adjectives.
   Again into
1. Concrete = viewed in connexion with the individual object.
2. Abstract = viewed apart from such connexion.
   Again into
1. Positive = denoting a reality.
2. Negative = denoting the absence of reality.
   Again into
1. Definite = marking out the precise object.
2. Indefinite = not marking out the precise object.
   Cum multis aliis.

20.

EXTENSION AND COMPREHENSION.

The process of Generalisation may proceed only to a very small degree, and thus form a concept, having a very few objects noted under it; or it may proceed to a very high degree, and include an immense number of objects all united into one concept, by extremely general resemblances.

Thus the term Englishman is less general than European; European less general than Man; Man less general than Animal; Animal less general than Organised Being; and Organised Being less general than Substance.

By the *extension* of a term, then, we mean the precise degree of generality that is attached to it. Thus an individual or singular term has the least extension; a universal word, like “substance,” the greatest extension.

The *comprehension* of a term signifies just the reverse of the extension. In proportion as any term
becomes less general, it comprehends a greater number of ideas under it, and is more complex in its signification. Thus the word European comprehends more ideas in it than the word Man; and Man more than Animal.

While the extension of a term, accordingly, depends upon the number of individuals it includes; the comprehension depends upon the complexity of the ideas. The term substance involves all possible individual existences; i.e. has the greatest possible extension. The individual term Caesar comprehends in it on the other hand all the ideus which are involved in the more general terms European, Man, Animal, Organised Being, and Substance. The one marks the universality of an idea,—the other marks its complexity.

Hence the greater the extension of a concept the less the comprehension; and, vice versâ, the greater the comprehension the less the extension.

21.

PRÉDICABLES.

To predicate is to affirm one thing of another. In making an affirmation the thing predicated must necessarily be more general* than that respecting which the affirmation is made. Thus if I say, Animals are Men, the proposition is untrue in its whole extent. If I say, Human Beings are Men, the proposition is true, but merely verbal. If I say, Men are Animals, then there is a valid assertion made, which is universally true.

In the first, the subject of the assertion is more general than the predicate; in the second they have both the same degree of generality; while in the third,

* Sometimes the predicate is, literally speaking, of the same generality as the subject, only consisting of more intelligible language. But in these cases the affirmation only amounts to a mere definition of terms, and does not convey any new truth.
the predicate is more general than the subject. All predicates, then, are of necessity general (or universal) terms; but some, of course, more general than others. The doctrine of the predicables is an attempt to classify them in reference to their generality; that is, to arrange in due order, under certain heads, every kind of truth that can be properly predicated of any subject.

If I affirm of an individual thing that it belongs to a certain class; as “This flower is a rose,” I designate in so doing the species. If I affirm of a flower, that it is a vegetable production, I now designate the genus. If I say Man is rational, I designate neither genus nor species distinctively, but the particular quality which distinguishes him from all other beings. This is termed the differentia. Once more, if I say “Man is vertebrated,” I designate again a universal property in man—though not the distinguishing one. This then is termed simply Proprium. Lastly, if I say “That man is red-haired,” I designate a fact which is a mere accident to the individual—(Accidens).

Thus, then, we may predicate of a thing:—
1. Its Genus. 2. Its Species. 3. Its Differentia.

Genus. The Genus is the most universal of the predicables; so universal that it always has one or more species under it. It is not always, however, of the same degree of generality; hence the distinction of summum genus, and genus subalternum. The summum genus is that which has no more universal term over it; such as “substance.” If a genus, on the contrary, has other genera over it, though of course several species under it, then it is called Genus subalternum. Thus the word “dog” has the term animal above it, and many different species of dogs below it. It is therefore a subaltern genus.

Species. Species denotes, primarily, a class having only individuals under it. It is frequently used however to denote species of a more general kind; hence
the distinction between *species infima*, and *species subaltema*. If a species denote the lowest possible class, it is called species infima; if it have *classes* as well as *individuals* under it, it is termed species subaltema. Hence *summum genus* and *species infima* stand at the two extremes of generality; while all the intermediate steps may either be termed a subaltem species, or a subaltem genus, according as they are regarded in relation to more general terms above them, or less general ones beneath them.

Thus "dog" is a subaltem genus in reference to the various species of dogs; but a subaltem *species*, in reference to the different kinds of *animals*.

**Differentia.** The differentia is the one particular property which marks a species, and distinguishes it from all others. Thus the property "rational" is the distinguishing feature of man, in reference to all other animals.

**Proprium.** By proprium we mean logically a property which is universal and necessary to a whole genus or species; but which is possessed at the same time by certain other genera or species as well. It coincides with the differentia in being a *universal* attribute, but differs from it, in *not* being peculiar.

**Accidens.** An accident is a property which may or may not belong to an individual viewed in relation to a species; or to a species viewed in relation to a genus. Some accidents are termed separable, others inseparable;—the former when they can be separated *in thought* from the individual, the latter when such separation is impossible: *e.g.*, "M. Cousin is an inhabitant of Paris," denotes a separable accident, because he might live elsewhere; but "M. Cousin is a native of Paris," is an inseparable accident, since the fact can never possibly be otherwise.

The following table gives a synoptic view of the Predicables. Taking *Man* as the subject, the words
in italics will give predicates of the kind denoted by each one of the subdivisions.

Every predicate expresses either

1. The whole essence of the subject, i.e. the species, rational animal.
2. or, Part of its Essence.
3. or, Something joined to the Essence.

Genus, animal.

Differentia, rational.

Property.

Accident.

Universal but not peculiar, vertebrated.

Peculiar but not universal, poetical.

Universal and peculiar, visible.

Separable, Inhabitant of Paris.

Inseparable, Native of Paris.

22.

CATEGORIES.

As the Predicables give us a classification of all possible predicates to any given subject, so the Categories were intended to classify under a given number of heads, all the subjects respecting which anything can be predicated. Aristotle's classification is as follows:—

1. Substance.
2. Quantity.
3. Quality.
4. Relation.
5. Action.
6. Passion.
7. Place.
8. Time.
This classification is now generally allowed to be both useless and incorrect. The attempt to classify all our ideas is so purely a metaphysical problem, that it is for the most part excluded from treatises on Formal Logic, and assigned over to the proper science to which it really belongs.

23.

DIVISION.

By division we mean the distribution of a logical whole into its several parts. This process is exactly the opposite of Generalisation. In Generalisation we lay aside the differences, and form a mental unity out of a number of individuals agreeing in some given point. In division we start from a generalised idea, and by adding on the differences before laid aside, redistribute it into its more specific parts. Thus, by adding the points of distinction, we may divide the word "metal" into gold, silver, iron, lead, etc.

The use of division is to assist us in the accurate apprehension of any given term; which it does by presenting the several things which are really included under the one common name. To divide a subject accurately, the following rules should be observed:—

1st. The division must be adequate; i.e., the parts must be exactly equal to the whole, neither more nor less. Thus, if in enumerating the parts of speech we were to leave out the preposition, or insert the participle, we should err in the first instance by defect, in the second by redundancy.

2nd. The division must be distinct; i.e., the parts must really be disjunct and opposed to each other. When we fail in this respect, i.e. when we depart from the principle of classification with which we set out, and enumerate some two or more terms which really include each other, we are guilty of what
is called a cross division. Thus to divide all the land into continents, islands, and peninsulas, would be a cross division; inasmuch as first and third term may include each other.

3rd. The division should be made into parts which stand in the same order of generality in reference to the whole. If this rule be not observed, some one of the terms of a lower degree of generality will most probably be included in one of the others. Or if this is not the case, then the division will be inadequate. The best division is that, in which the subject is divided into its proximate parts; i. e., into parts only one degree removed in the order of generality from the subject itself.

There is nothing more important for giving clearness and order to our mental operations than to divide the subject on which we are thinking with the utmost logical accuracy. The above rules, if rigidly adhered to, would obviate many a difficulty, and render simple what otherwise seems inextricably confused.

It will add much to the facility with which a division is effected, if we keep in mind the different senses in which the term whole is employed.

1. A logical whole, means a genus, while the parts of it are the species.

2. A formal whole, is one which is made up of the parts of definition. Rational animal, is a formal whole, of which the parts are rationality and animal existence.

3. An essential whole, is viewed in reference to the component parts. Thus man is a whole, the body and the soul the parts.

4. An integral whole, is made up of separable parts. A plant is a whole; the root, stem, leaves, and blossom, the parts.

It is simply the first kind of whole that we are immediately concerned with in a logical division, as that only depends upon the laws of generalisation.

24.

DEFINITION.

Definition, in Logic, means the perfect explanation of what is implied by a given Term. General terms
are frequently learned by us, the real process of whose formation we know nothing about. Hence the necessity of their being properly defined, in order that we may employ them correctly. To understand a Term accurately, we must know two points respecting it: first, in what respect it agrees with other Terms; secondly, in what respect it differs from them. Now, we show the agreement when we point out the genus to which it belongs; and we show the disagreement when we point out the differentia. Hence the rule for the logical definition of a Term is—that we assign its genus, and its differentia; for in that way we express the whole essence of the thing in question.

Care should be taken that a definition is adequate, i.e. neither too extensive, nor too narrow. If we define a violin to be "a musical instrument with four strings," the definition is too extensive; or, in other words, the differentia is not correctly assigned. So, if we define an animal to be "an organised being with a vertebrated spine," the definition is too narrow.

Species alone admit of real definition. The summum genus, and the individual, can only be described; for we cannot point out either their genus or differentia. The same may be said of indefinite and negative terms, of aggregates and concretes.

Metaphorical terms are more or less used by all writers and speakers, and used frequently when they are hardly aware of it. It is needless to say that such terms do not admit of exact definition. They must rather be explained—stripped of their figurative dress—put into a purely abstract form—and then defined.
II. ON PROPOSITIONS.

25.

Hitherto we have treated only of individual terms and concepts. We have shown how they are formed, how classified, how they may be regarded in relation to their extension and comprehension, how divided, and how defined. A single term does not express, however, a complete thought; to do this we require a proposition, that is, according to the usual definition, "A judgment clothed in words."

Every proposition, logically considered, consists of three parts: the subject, the predicate, and the copula. The subject is that of which something is affirmed; the predicate is that which we declare respecting the subject; the copula (consisting of the substantive verb "to be") connects the two terms together.

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<tr>
<th>Sub.</th>
<th>Cop.</th>
<th>Pred.</th>
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<tbody>
<tr>
<td>Man</td>
<td>is</td>
<td>mortal.</td>
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In Logic the proposition is always regarded as existing in one particular form, namely, as consisting of two terms coupled together by the verb "to be." It is needless to say that, grammatically speaking, the proposition assumes a variety of other forms; the copula being often concealed in the finite verb.

26.

SUBSTANCE OF PROPOSITIONS.

With regard to their substance, propositions are either simple or compound. A simple proposition is said to be categorical, because it makes one direct assertion, without any condition or qualification.

All men are mortal.

Compound propositions occur in various forms. Some are copulative, some disjunctive, some hypothetical, and some adversative. Of these we shall speak hereafter.
Categorical propositions are sometimes divided into pure and modal. A pure categorical proposition is one which asserts a truth without any qualification whatever. A modal proposition is one which asserts a truth in some particular form, or with some particular qualification: as,

John is gone home — *Pure.*
John is probably gone home — *Modal.*

In modal propositions the assertion is called the dictum; the qualification the modus. Every modal proposition may be converted into a simple one, by turning the dictum into a subject and the modus into a predicate, and then forming a new proposition of them; thus: That John has gone home is probable.

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PURE CATEGORICAL PROPOSITIONS.

27.

QUALITY.

Every categorical proposition possesses Quality. By the quality of a proposition is meant its power of expressing an affirmative or a negative judgment.

Gold is a metal — *Affirmative.*
Salt is not a metal — *Negative.*

The negation in propositions is expressed variously: sometimes by the negative particle, as above; and sometimes by no, neither, not any, etc.: as,

No fools are admired.

If the negative particle affects only the *predicate,* the proposition may be treated as affirmative: as,

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<tr>
<th>Sub.</th>
<th>Cop.</th>
<th>Pred.</th>
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<tbody>
<tr>
<td>These men</td>
<td>are</td>
<td>no fools.</td>
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28.

QUANTITY.

Every proposition has quantity. By the quantity of a proposition is meant the power it has of affirming something of the whole, or of only some part of the
subject. A proposition which affirms something respecting the whole extent of the subject is called universal: as,

All men are mortal.

A proposition which affirms something respecting a part only of the subject is called particular: as,

Some men are wise.

Thus the quantity of a proposition depends upon whether the subject is taken in the whole of its extension or only a part of it.

A. The following subjects are considered as taken universally, that is, (in technical language,) as being distributed.

1. Singular terms: as, John is happy.
2. Terms with some adjective prefixed (whether affirmative or negative) which denotes universality: as all, every, no, not any, etc.: — as,

All men, or every man \{ are \} mortal.

No man, or not any man is to be despised.
3. Indefinite terms, so used as to imply universality: as,

Bees are wise insects.

B. The following subjects are considered as taken in a particular sense; i.e., as being undistributed.

1. Terms with an adjective prefixed that denotes particularity: —

Some men are wise.

2. Indefinite terms so used as to imply a particular rather than a universal signification: —

Cherries are ripe.

The way in which the quantity of indefinite terms is decided is, by considering the matter of the proposition itself. When the truth expressed implies necessity or universality, an indefinite term is taken in its whole extension; when a mere contingent truth is expressed, an indefinite term is to be regarded as particular. It is universally true, for example, that Bees are wise
insects, but only contingently so that Cherries are ripe. Hence "Bees" is regarded as a universal term, "Cherries" as a particular one.

29.

QUANTITY OF THE PREDICATE.

The quantity of a proposition, taken as a whole, depends upon the subject being either universal or particular, as the case may be; but it is equally important for us to consider the quantity of the predicate, since there are various important conclusions depending upon it.

The general rule for the extension of the predicate is: that in all affirmative propositions it must be regarded as particular; while in all negative propositions it is universal.

The reason of this will be evident, when we consider that all we assert in an affirmative proposition is, that the predicate includes the subject. Thus in the proposition,

All stones are minerals,

we only employ the word minerals in so far as it coincides with the word stones: that is, only in a part of its extension.

On the other hand, in a negative proposition, we assert that no part of the subject is contained in any part of the predicate. Thus when I say,

No stones are metals,

I exclude the notion "stones" from the entire extension of the word "metals;" and consequently use it in its whole generality.

If the quantity of the predicate were properly expressed, i.e. the exact extent in which the term is employed, in each case, clearly noted, it would add much to the simplification of all the succeeding logical forms, whether in the conversion of propositions, or in the mechanism of the syllogism. As this idea, how-
ever, first proposed by Sir W. Hamilton, has not yet been generally adopted, we shall present the syllogism in the usual manner, merely indicating where simplifications might be made by means of the quantification of the predicate.

30.

We have now explained—1. Of what parts every proposition consists; viz. of a subject, predicate, and copula. 2. We have shown how propositions may be classified, in reference to their substance. 3. In regard to simple, categorical propositions, we have pointed out what is meant by their quality, and their quantity. 4. And we have shown, last of all, how to determine the quantity of the predicate.

For convenience’ sake, Logicians have agreed to represent propositions, in reference to their quality and quantity, by the four vowels, A, E, I, O. Thus, as there are two kinds of quality, and two of quantity, the four kinds of proposition resulting from their combination are as follows:

1. Universal affirmative = A.
2. Universal negative = E.
3. Particular affirmative = I.
4. Particular negative = O.

We have next to show, when any given proposition is presented to us, what other propositions may be correctly and logically drawn from it.

Let us take as an example, the oft-repeated proposition,

All men are mortal:

What can we at once conclude from this? i.e., what other propositions can we affirm as included in it?

First, then, if we know that all men are mortal, we can positively affirm the less general truth, “Some men are mortal.” This conclusion of a particular truth from a universal, is termed subalternation.
Secondly, by transposing the terms we can also affirm that "Some mortals are men." This is termed conversion.

Thirdly, by turning the affirmative into a negative, we can again predicate that, "No men are not mortal." This is termed opposition. We must next explain, therefore, the laws of subalternation, of conversion, and of opposition.

---

31.

SUBALTERNATION.

By subalternation we mean the conclusion of a particular truth from a universal. The correctness of the conclusion depends upon the relation which a logical whole bears to its parts. If the whole includes the parts, then what is true of the whole must be true of each part taken separately. The universal truth is called the subalternans, and the particular one, deduced from it, the subalterna. The two rules of subalternation, then, are as follows:

1. From the truth of the subalternans follows, necessarily, the truth of the subalterna.

   All men are mortal—Subalternans.
   ⊢ Some men are mortal—Subalerna.

2. From the truth of the subalterna nothing can be concluded respecting the truth of the subalternans.
   From the proposition, "Some birds are rapacious," you cannot conclude anything whatever respecting all birds.

---

32.

CONVERSION.

To convert a proposition means to transpose the terms, and thus draw another proposition from it of the same quality.
In some propositions this is very readily accomplished, a simple transposition of the terms being all that is necessary to do so.

Thus from the proposition, *No stones are metals*, it follows at once that *No metals are stones*. So also it follows from the proposition, *Some birds are rapacious*, that *Some rapacious things are birds*.

But a simple transformation will not always hold good. Thus we cannot conclude from the proposition, *All metals are minerals*, that *All minerals are metals*: nor from the proposition, *Some minerals are not stones*, that, *Some stones are not minerals*.

From the above instances we see, that the two kinds of propositions in which a simple transposition can take place are, a universal negative, *E*, and a particular affirmative, *I*. And the reason of this is plain;—for as in *E* both subject and predicate are *distributed*, there is no change made in the extension of either term by a simple transposition of them. So also, as in *I* both terms are *undistributed*, they are both taken exactly in the same extension when converted.

On the contrary, if we take a universal affirmative, *A*, such as *All metals are minerals*, here the subject is universal, and the predicate particular (§29). But if we transpose the terms, immediately the predicate, which was particular, becomes universal; and the subject, which was universal, becomes particular; so that any conclusion thus drawn, would violate the rules of subalternation (§31). To convert a proposition *A*, therefore, we must not only transpose the terms, but *limit the quantity*, and conclude another proposition in *I*. Thus from the proposition, *All metals are minerals*, you can simply conclude, by transposition, that Some minerals are metals. This is called conversio per acciden, or otherwise, conversion by limitation.

But then, what are we to do with *O*, which can be converted in *neither* of these two ways? The simplest method is to attach the negative to the predicate;
then O becomes I, and can be simply converted. Thus from,—

Sub. Cop. Pred.
Some minerals are not stones,

it follows that Some things that are not stones are minerals. This is termed conversion by negation.

As a proposition in E can be converted by limitation as well as simply; and a proposition in A can be converted by negation as well as by limitation, the whole of the possible methods of conversion may be thus summed up:—

E, I, are converted simply.
A, E, are converted by limitation.
A, O, are converted by negation.

If the exact quantity of the predicate were expressed in each case, then every proposition might be simply converted; for then each term being affirmed of every other in a precise sense, the simple transposition would take place without violating any of the rules of subalternation.

33.

OPPOSITION.

By opposition we mean the difference in quality between propositions which have the same subject and predicate. Take the two following opposites:—

All stones are minerals.
Some stones are not minerals.

Now here there is a positive contradiction, of such a nature that if one of the propositions be true, the other must be false. Hence, if you know the truth of either of these propositions, you can at once conclude on the falsity of the other;—an inference which directly follows from the laws of subalternation.

Again, if I affirm as true, No stones are metals, it is equally certain that the proposition, "Some stones
are metals," is false; and for the same reason as that above stated.

In these two cases it will be seen there is a complete opposition, not only in quality, but also in quantity, between the two propositions in question; hence they are called contradictories. Contradictories, then, are so related that one of them must be false, and the other true. This may be exemplified in the following couple:

All men are good;
Some men are not good;

where we see by a moment's reflection that we have one false proposition, and one true one. Logic has nothing to do with determining which one is false, and which true; it merely decides their relation to each other.

But again, take the following two propositions:

All stones are minerals.
No stones are minerals.

Now of these two propositions you may immediately conclude, as before, the falsity of one from the known truth of the other. But it may also happen that both of them are false, which will certainly be the case if the predicate happens only partially to agree with the subject, as in the following couple:

All men are good—(false).
No men are good—(false).

Opposition, then, between two universal affirmative propositions, is called contrariety; and the two propositions are called contraries to each other.

Once more, take the two following propositions:

Some stones are minerals.
Some stones are not minerals.

Now both of these propositions may be true, but they cannot possibly both be false. It may easily be the
case, however, that the one is true, and the other false. Opposition between two propositions, such as these, i.e. between two particular affirmations, is called subcontrariety; and the propositions themselves, are called subcontraries.

The laws of opposition, then, may now be summed up in few words. Opposition can take place in three ways:

1. Between two universal propositions.
2. Between two particular propositions.
3. Between two propositions, the one of which is universal, and the other particular.

The first are called contraries.
The second are called subcontraries.
The third are called contradictories.

In the first, both may be false, but both cannot be true; and if one is true the other must be false.

In the second, both may be true, but both cannot be false; but if the one is false, the other must be true.

In the third, one must be false, and then the other must be true.

With regard to the question, which of the propositions is true, and which false, in each instance? this of course depends upon the matter, whether it be necessary, or impossible, or contingent. In necessary matter the affirmative will always be true, and the negative false; in impossible matter the negative will always be true, and the affirmative false; while in contingent matter the particular will always be true, and the universal false.

Opposition between two singulars is reckoned as contradiction, not contrariety, because they absolutely exclude each other.

The following scheme conveys to the eye the whole of the principles of opposition:—n. i. c. meaning
respectively, necessary, impossible, and contingent matter; and t. and f. meaning true, and false; then n. t. will mean, in necessary matter, true; i. f. in impossible matter, false, etc.

34. COMPOUND PROPOSITIONS.

We have shown the most important points to be noted respecting simple categorical propositions. It only remains, under this division of the subject, to explain briefly the varieties of the compound proposition.

1. The copulative proposition is that in which the parts are joined by the copulative particle "and," as:

   England and France are in Europe.

Here, for the proposition to be true, all the parts must be true.
2. The disjunctive proposition is that in which the parts are united by the disjunctive particle "or," as:

John or Mary is to blame.

Here, for the proposition to be true, only one of the parts need be correct.

3. The adversative proposition is that in which the parts are related by an adversative particle, such as "though," or "although:"

Though Cicero was a Roman, he was also a philosopher.

4. The hypothetical proposition is that in which the parts are united by some conditional particle, such as "if:"

If animals think, they have souls.

While a term simply answers to a generalised idea, a proposition answers to a complete thought, in which there is a perceived relation between two ideas of a different degree of generality. The copula simply expresses this relationship. Thus, if I say "Coal is black," all that I mean, logically, is that the cluster of other qualities forming the phenomenon coal, is always associated with the one quality black. So, if I say "Coal is a mineral," all I mean, logically, is that the qualities peculiar to coal are only found in connexion with the general qualities which make up the concept "mineral." Thus every logical proposition is a species of equation having qualities for the terms employed; and all logical statements may be thus shown to admit of an algebraical form. — Vide Boole's "Investigation of the Laws of Thought."
III. ON REASONING

35.

In explaining the nature of subalternation, conversion, and opposition, we showed how, from a given proposition, a number of other propositions might be correctly drawn. In these cases, however, the new propositions did not contain any new truth; they were simply different ways of arranging the very same terms, so as to present the contained truth in a variety of different forms.

In reasoning, however, we deduce from two or more given propositions, a new truth which is not _directly_ contained in either of them.

When reasoning is stated in a purely logical form, it is termed a _Syllogism_. Our object, therefore, in the present division of the subject, will be to explain the nature of syllogisms,—their mechanism, and their laws.

The following is a syllogism in regular form:—

All philosophers are studious,
Caius is a philosopher,
Caius is studious.

Let us see of what it consists.

_Proximately_ it consists of three propositions. The two first are called the premises, and the last is called the conclusion.

If we look more closely into each of these propositions, we shall find that they are altogether made up of _three terms_. The question which has to be discussed, and the conclusion we desire to draw, is the fact contained in the _last_ of the three propositions, _viz._, _Caius is studious_. In this proposition, as in all others, the subject is necessarily _less extensive_ than the
predicate. Hence, the predicate of the conclusion has been named the major term, and the subject of the conclusion the minor term. This is invariably the case in all regular syllogisms.

Now to compare the two terms, Caius and studious, and prove their congruity, we select a third term, which we know to be related to both; so that by showing the agreement of the major and minor with this third or middle term, we can determine their agreement with each other.

The process is in form similar to that by which we ascertain any two objects at a distance to be of the same length. As we cannot compare one with the other directly, we compare them both with some common standard, and, by means of their relation to it, conclude upon their relations to each other.

In making this comparison in the above syllogism, we first take the major term studious, and compare it with the middle term philosophers; thus,—

All philosophers are studious:

This is called the major premiss, because it is that which contains the major term.

Next we take the minor term, Caius, and compare it also with the middle term; thus,—

Caius is a philosopher:

This is called the minor premiss, as containing the minor term. Then from the two—

All philosophers are studious, and Caius is a philosopher,

we deduce,— Caius is studious:

which is the conclusion.
CONCLUSIVENESS OF SYLLOGISM.

Let us now see on what the conclusiveness of the syllogism (i.e. the *vis consequentiae*) depends. The whole theory is founded upon the relation of a logical whole to its parts; consequently it springs primarily out of the very nature of *the concept*, as a valid act of generalisation. The relation of a logical whole to its parts is such, that whatever can be affirmed or denied of a *genus*, can also be affirmed or denied of all the species or individuals included in it.

Now in every syllogism there is something affirmed or denied of a genus in the *major premiss*. The major premiss, accordingly, really *involves* the conclusion, only in too disguised a manner, frequently, to be at first seen. The truth, *e.g.*, that all philosophers are studious, involves the truth that Caius is studious; only it has to be shown that Caius is really a philosopher, to make that conclusion self-apparent.

The major premiss, then, states the *general truth*, upon the knowledge of which the whole argument is based; — the minor premiss next draws the subject of the conclusion into the scope of this general assertion, by showing that it is a *species* under the very genus, respecting which the first affirmation was made. This being done, the conclusion follows, that the species or individual (Caius) must also agree with that same term *studious*, with which the genus it has been shown to belong to (viz. philosophers) also agrees. This is the principle expressed by the celebrated axiom of Aristotle generally called the "Dictum de omni et nullo," which may be thus expressed: — "That whatever is *predicated of a term in its full extension,*
whether affirmatively or negatively, may, in like manner be predicated of every thing contained under it.

37.

GENERAL LAWS OF THE SYLLOGISM.

We have explained what the nature of a Syllogism is, and on what general axiom its validity is based. The principal things to be kept in mind are—First, that in every syllogism there are three terms, the major, the minor, and the middle term. Of these the major has the greatest extension, the minor the least, while the middle term has an extension between the two. Hence the major and minor terms are sometimes called the extremes. Secondly, that in every syllogism there are also three propositions; the major premiss, comparing the major and the middle term, the minor premiss, comparing the minor and the middle terms, and the conclusion, comparing the extremes. The whole object of the syllogism is to compare these extremes with each other by means of their mutual relation to a third term.

In the syllogism which we have already adduced, all the three propositions are universal affirmatives (A A A). Such, however, need not be the case. All four kinds of propositions, affirmative and negative, universal and particular, may take their place in a regular syllogism; as in the following:—

\[ \text{E.} \rightarrow \text{No stones are metals.} \]
\[ \text{A.} \rightarrow \text{All flints are stones,} \]
\[ \therefore \text{E.} \rightarrow \text{No flints are metals.} \]

And again:—

\[ \text{A.} \rightarrow \text{All stones are minerals,} \]
\[ \text{I.} \rightarrow \text{Some marbles are stones,} \]
\[ \therefore \text{I.} \rightarrow \text{Some marbles are minerals.} \]

Now there are certain rules which apply to all syllogisms, the violation of any one of which would pro-
duce an illegitimate and false conclusion. These rules are easily reduced to six; three respecting quantity, two respecting quality, and one respecting both.

Rule I.—The middle term must be once distributed, i.e. taken in its whole extension. Were this not the case there would be no fixed standard of comparison between the extremes—since one of them might agree with one part of the middle term, and the other with another part: so that in fact there would be two middle terms employed. Thus from the following premises no conclusion could be drawn:—

Some philosophers are studious,
Caius is a philosopher:

for the philosophers that are studious, and the philosophers to which Caius belongs might be two different species, and have no relation to each other in respect of studiousness.

Rule II.—Neither of the extremes must be taken more universally in the conclusion than they are in the premises; for if they are, we draw a broader inference than the premises warrant. Take the following example:—

Many animals chew the cud,
Men do not chew the cud,

\[ \therefore \text{Men are not animals.} \]

Here "animals" is taken only in part of its extension, in the major premiss, and in the whole of its extension in the conclusion (§ 29). We have, therefore, an illicit process of the major. If it were true to say, All animals chew the cud, then the conclusion would be justified.

Rule III.—If both premises be particular, no conclusion whatever can be drawn. For in this case either the middle term will be undistributed, or there will be an illicit process similar to that given under the last rule.
Rule IV. — If both premises be affirmative, the conclusion must be so too. Self-evident.

Rule V. — If both premises be negative, no conclusion whatever can be drawn. For in this case, the middle term is shown to disagree with both the major and the minor, so that it cannot serve as any standard of comparison between them.

Rule VI. — The conclusion always follows the weaker part. That is, if one of the premises be particular, the conclusion must be particular; and if one of the premises be negative, the conclusion must be negative also. The first arises from the laws of sub-alternation, which does not allow us to conclude anything respecting a whole genus from what is true of a species. The second arises from the fact, that agreement cannot be inferred from disagreement.

38.

OF MOODS.

It has been already shown, that all the four kinds of propositions, viz. A, E, I, O, may enter into a correct syllogism. It does not follow from this, that any combination of them will suffice to form an argument, valid in form. Many combinations, we see at once, would violate several of the general rules laid down in the last paragraph — such as A E A; A I E, &c. Now the combinations which a syllogism can take in relation to the quantity and quality of its three propositions, are called Moods; and it is important to determine both how many moods are possible and how many are valid.

With regard to the possible number of moods, this is a mere question of Arithmetic. There are four kinds of propositions (A, E, I, O), and three propositions in each syllogism. Now any one of these four kinds of propositions may be in the major premiss, and any one of them also in the minor. This will give $4 \times 4$, 

\[ c 4 \]
or 16, different forms for the two premises. But each of these 16 premises may have any one of the four kinds of proposition for a conclusion—consequently, the possible combinations of them in the syllogism are in number $16 \times 4$, or 64.

Now of these 64 possible combinations, no less than 53 are excluded. For 28 will be found to violate the 3rd and the 6th of the general rules; 18 violate the 5th rule; 6 violate the fourth; and one is useless as giving a particular conclusion, when a general one is admissible. Eleven moods therefore remain as valid for framing a legitimate syllogism. These are $A\ A\ A$; $A\ A\ I$; $A\ E\ E$; $A\ E\ O$; $A\ I\ I$; $A\ O\ O$; $E\ A\ E$; $E\ A\ O$; $E\ I\ O$; $I\ A\ I$; $O\ A\ O$.

39.

OF FIGURE.

It has been already shown, that the middle term appears both in the major and minor premiss of a syllogism. It is not necessary, however, that it should always hold the same place there.

In most of the syllogisms, which we have already cited, the middle term stands as the subject of the major, and the predicate of the minor premiss. But it may be also the subject of both, or the predicate of both, or the predicate of the major, and the subject of the minor. Now these four different positions, which the middle term can take in the premises of a syllogism give rise to what are called the 4 figures.

In the 1st figure, the middle term is the subject of the major and the predicate of the minor:

All stones are minerals,
Marble is stone,
∴ Marble is a mineral.

In the second figure, the middle term is the predicate of both premises:
No good man delights in hurting the feelings of others,
Libellers delight in hurting the feelings of others,
\[\therefore\] No good man is a libeller.

In the third figure, the middle term is the subject of both premises:

All true penitents will find mercy,
Some true penitents have been great sinners,
\[\therefore\] Some, who will find mercy, have been great sinners.

In the fourth figure the middle term is the predicate of the major and the subject of the minor:

All stones are minerals,
No minerals are organised,
\[\therefore\] No stones are organised.

40.
OF MOOD AND FIGURE COMBINED.

We have before seen, that there are 11 moods which do not violate any of the general laws of the syllogism. Of these 11 moods there are 6 which will hold good in each figure. Taking, then, mood and figure together, there are 24 conclusive forms of the syllogism. Several of these, however, are useless, as giving us a particular conclusion, where a universal one is equally legitimate, so that the one is really involved in the other. Leaving out, therefore, the useless moods, we find that there are 4 which can stand in the first figure, viz. \(\text{A A A; E A E; A I I; and E I O}\); that there are 4 which can stand in the second figure, viz. \(\text{E A E; A E E; E I O; and A O O}\); that there are 6 which can stand in the third figure, viz. \(\text{A A I; I A I; A I I; E A O; O A O; and E I O}\); and that there are 5 which can stand in the fourth figure, viz. \(\text{A A I; A E E; I A I; E A O; and E I O}\).—Nineteen available moods in all.
To aid the memory of the student these moods have been combined into the following 5 hexameter lines.

Fig. 1. *Barbara, celarent, Darii, ferioque prioris.*
Fig. 2. *Cesare, camestres, festino, baroko secundæ.*
Fig. 3. *Tertia, Darapti, disamis, datisi, felapton,*
*Bohardo, ferison* habet; *quarta insuper addit,*
Fig. 4. *Bramantip, camenes, dimaris, fesapo, fresison.*

In these lines the three vowels in each of the words printed in italics give the moods of each figure. Adopting, therefore, this phraseology, we can speak of a syllogism being drawn in *Barbara,* in *Camestres,* &c., the very mention of which words determines at once the mood and the figure, when the five hexameters have once been committed to memory.

41.

**SPECIAL RULES OF THE FIGURES.**

As each of the four figures places an argument in a particular form, determined by the position of the middle term in the premises, so each is subject to certain *special* rules, in addition to the six general rules before explained.

**SPECIAL RULES OF THE FIRST FIGURE.**

1. The major must be universal,
2. The minor must be affirmative.

For if the minor is negative, the major must be affirmative (Rule 5), and the conclusion negative (Rule 6). Then the conclusion being negative, the major term would of necessity be taken universally *in the conclusion* (§ 29): whereas it could only be taken particularly in the major premiss, as being the predicate of an affirmative proposition; so that Rule 6 would be violated. Also the major must be universal, or else the middle term (being *particular* in the minor) would not be once distributed, and Rule 1 would be violated.
SPECIAL RULES OF THE SECOND FIGURE.

1. The major must be universal,
2. The conclusion must be negative.

For in the second figure the middle term is the predicate of both premises. Hence one of them must be negative (or the middle term would not be taken once universally), and consequently the conclusion must be negative. Also the major must be universal, otherwise the major term, being taken universally in the conclusion (as being the predicate of a negative proposition), would only be taken particularly in the premises. (Violation of Rule 6.)

SPECIAL RULES OF THE THIRD FIGURE.

1. The minor must be affirmative,
2. The conclusion must be particular.

In the third figure the middle term is the subject of both premises. Now if the minor were negative the major would have to be affirmative, and consequently the major term would be particular; whereas the conclusion being negative it would be there taken universally. (Violation of Rule 6.)

The conclusion must also be particular because one of the extremes at least must be particular where they are both the predicates of the two premises. Were this not the case, both premises would be negative, and no conclusion whatever could be drawn.

SPECIAL RULES OF THE FOURTH FIGURE.

The special rules of the fourth figure are merely hypothetical; namely, 1. If the major is affirmative the minor must be universal. 2. If the minor is affirmative the conclusion must be particular. 3. If either premiss be negative, the major must be universal.

As the fourth figure is an awkward, and in fact useless, form of syllogistic reasoning, we need not dwell upon these special rules any farther than merely men-
tioning them. The student by a little thought can easily verify them for himself.

The first, second, and third figures, have all certain advantages, according to the kind of argumentation we are desirous of carrying on.

The first figure is in form by far the most perfect. All syllogistic reasoning, be it observed, proceeds upon the subordination of a part to a whole; i.e. on the dictum, that what is true of the genus is true of all the species under it. The syllogism therefore should be so framed, as to show this subordination through the intervention of the middle term, in the clearest possible way. This is accomplished only in the first figure, where everything proceeds regularly according to the dictum de omni et nullo:

All men are mortal,
John is a man,
John is mortal.

The second figure, having always a negative conclusion, is well adapted for disproving something that has been affirmed by an opponent:

None who despise charity are truly virtuous,
Bigots despise charity,
Bigots are not truly virtuous.

The third figure is a convenient form in which to establish a particular objection to some sweeping affirmation:

Every animal has feeling,
Some animals are men,
Some men have feeling.

The fourth figure should never be employed at all.

42.

REDUCTION.

The first figure being much more perfect in form than the rest, Logicians have invented methods, by
which all the moods of the other three figures may be reduced to this. The process by which this is effected is called Reduction.

The whole art of reduction depends on the laws of conversion. (§ 32.)

Sometimes we need only to convert simply one of the premises, and the syllogism at once takes the form of the first figure.

Thus let the syllogism be Cesare:

\[
\begin{align*}
\text{No mineral is organised,} \\
\text{All plants are organised,} \\
\therefore \text{No plants are minerals.}
\end{align*}
\]

Convert the major simply, and we have:

\[
\begin{align*}
\text{No organised being is a mineral,} \\
\text{All plants are organised beings,} \\
\therefore \text{No plants are minerals;}
\end{align*}
\]

which is a syllogism in Celarent of the first figure.

Sometimes again the premises must be transposed as well as converted.

Thus let the syllogism be Camestres:

\[
\begin{align*}
\text{Every plant is organised,} \\
\text{No mineral is organised,} \\
\therefore \text{No mineral is a plant.}
\end{align*}
\]

Here by converting the minor and then transposing the premises, we have:

\[
\begin{align*}
\text{No organised being is a mineral,} \\
\text{Every plant is organised,} \\
\therefore \text{No plant is a mineral;}
\end{align*}
\]

which is a syllogism in Celarent of the first figure: and we only need to convert the conclusion to get the very same truth as was expressed in the conclusion of the first syllogism.

When reduction takes place simply by means of conversion and transposition, it is called Ostensive.

There is another mode of Reduction, which is called reductio ad impossibile.
The process is as follows. If the conclusion be false, then the contradictory of it will be true. Take the contradictory and put it in the place of the minor premiss. In this way we shall have a conclusion which is the contradictory of the original minor. But that original minor was true by hypothesis; therefore the contradictory of it is false. If the conclusion, then, be false, one of the premises must be so; and this can be none other than the new minor: i.e. the contradictory of the original conclusion. Hence the original conclusion is true.

This is the mode of reasoning commonly known as a reductio ad absurdum.

Let us take an instance in Baroko:—

All plants are organised,
Some productions of nature are not organised,
∴ Some productions of nature are not plants.

Now if the conclusion be false, its contradictory is true, viz., All productions of nature are plants. Assume the truth of this and put it in the place of the minor premiss. Then we have a syllogism in Barbara:—

All plants are organised,
All productions of nature are plants,
∴ All productions of nature are organised.

Now this conclusion contradicts the original minor, which is true by hypothesis: it must consequently be false. A falsity, therefore, must lie in one of the premises, and that the minor (for the original major is true by hypothesis). But the new minor is the contradictory of the original conclusion: so that if it be false, the original conclusion must be true (§ 33).

The four Mnemonic lines above quoted are so formed as to show not only what moods are conclusive in each figure, but how the moods of the second, third, and fourth figure may be reduced to the first.

The four initial consonants B, C, D, F, show to which
mood of the first figure each of the others may be reduced. Each one, namely, may be reduced to that mood of the first figure which begins with the same letter.

Moreover the other consonants show how that reduction is to be effected.

Thus, s. means that the proposition immediately preceding it must be simply converted; p. that it must be converted *per accidens*; and m. that the propositions between which it stands are to be transposed. Lastly, k. shows that we must employ the reductio ad impossible, and that the proposition immediately preceding it must be left out, and the contradictory of the conclusion assumed in its place.

Thus in Dimaris, the initial D shows that it can be converted to Darii, of the first figure; m. shows that the major and minor premises are to be transposed; and s. shows that the conclusion is to be simply converted.

*Note.*

In the preceding sections we have explained the common doctrine respecting the four figures, and the method of reducing all the moods of the last three figures to corresponding moods in the first. It can hardly fail to strike any one, on first looking over this system of logical forms, that it is remarkably cumbersome in its structure, and on that account by no means likely to be a perfect representation of our mental operations. As all logical reasoning depends on showing the subordination of the parts to a logical whole, by means of a middle term, we should naturally look for some common symbol of reasoning, in which this process is made apparent by the very *form* of the syllogism. Such a symbol, as we before showed, exists in the syllogisms of the first figure; so that we ought to regard this as the true type of every deductive argument.

The real cause why such an extensive apparatus of moods and figures has been invented is to be found primarily in the indefiniteness, which attaches to the *quantity of the predicate*, in each of the premises. Just as the process of conversion is rendered uniform and simple by a duly expressed *quantification* of the predicate (Sec. 32), so also will the whole apparatus of mood and figure be obviated by the same simple operation.

All the special laws of the four figures only hold good in con-
sequence of the *indefiniteness of the predicates*. Quantify the predicates, and these laws are shown at once to be false.

The special laws of the first figure are:

1. That the major be universal.
2. That the minor be affirmative.

But in the following two syllogisms both these laws are set at nought.

Some men are certain foolish people,
All rational beings are all men,
Some rational beings are certain foolish people.

Again:

All metals are certain minerals,
No stones are metals,
No stones are certain minerals.

In the first of these syllogisms the major is particular; and in the second the minor is negative: yet both are conclusive, and both in the first figure.

In like manner the special rules of all the other figures may be shown unnecessary. In fact, if the syllogisms of the second, third, and fourth figures be properly arranged according to subordination of parts to a whole, it will be found that they will all naturally fall into the form of the first figure.

Take the following syllogism (Cesare of 2nd fig.):

No metals are stones,
All amethysts are stones,

\[ \therefore \text{No amethysts are metals.} \]

Here there is no subordination of parts to a whole *clearly shown*, but only one *implied*; namely this: No stones are metals; but all amethysts are stones; \[ \therefore \text{no amethysts are metals.} \]

The first syllogism is therefore only an awkward and imperfect way of stating the last. Put the terms in the proper order of logical subordination, and a regular syllogism of the 1st fig. immediately becomes apparent.

This new analysis of the process of reasoning has been for many years adopted by Sir W. Hamilton; and may be found pretty fully expounded in Mr. T. S. Baynes' Essay on the new Analytic of Logical Forms.

The one universal canon of logical reasoning which renders the special rules of the Figures nugatory, and includes all the general ones in a single *proposition*, is thus stated:

"What worse relation of subject and predicate subsists between either of two terms and a common third term, with which both are related — and one at least positively so — that relation subsists between the terms themselves."

*Vide Baynes' Essay, p. 53.*
NON-CATEGORICAL SYLLOGISMS.

43.

IRREGULAR SYLLOGISMS.

We have now explained pretty fully the nature of the categorical syllogism. We must next advert to those which are not couched in the purely categorical form. Non-categorical syllogisms may be divided into two classes: 1. Irregular, and 2. Hypothetical.

Irregular syllogisms are those which present either a deficiency or a redundancy in their mode of statement.

1. In common language we more generally than not employ an elliptical mode of reasoning,—leaving some one or other of the premises to be supplied by the mind of the hearer. For example, nothing would be more natural than to make such a statement as this;—"John is successful, because he is prudent." The force of this reasoning, of course, depends on the generally acknowledged sentiment, that prudence is the road to success. More commonly than not, indeed, we may suppress the major premiss in an ordinary argument, because the mind at once supplies it, as a generally received principle. A defective argument of this nature is called an Enthymeme.

2. A redundant syllogism is one in which there is some subordinate statement supplied to maintain one or other of the premises. Take the following:—

Every thing known by direct intuition is true; [since upon direct intuition all knowledge, and all reasoning, is primarily based.]

But our Mental Identity is known by direct Intuition,

"* Our Mental Identity is true.

This is called an Epicherema; or an Epicherematic Syllogism. The reasoning in an Epicherema may
always be reduced to two or more simple syllogisms. Thus, in the above case, it could be so stated—
That upon which all knowledge and reasoning is primarily based is true,
But all knowledge and reasoning is based upon direct Intuition,
\[\therefore\] Every direct Intuition is true.
Again: Everything known by direct intuition is true,
Our Mental Identity is known by direct Intuition,
\[\therefore\] Our Mental Identity is a truth.
Here, it will be seen, the conclusion of the first syllogism is made a premiss of the next. A string of syllogisms of this kind, all aiming at one final conclusion, forms a Sorites: only, to render the reasoning closer, the intermediate conclusions are suppressed till we come to the end.
The English are a brave people,
A brave people are free,
A free people are happy,
\[\therefore\] The English people are happy.

44.

HYPOTHETICAL SYLLOGISMS.

Hypothetical syllogisms are of two kinds:—1. Conditional, and 2. Disjunctive.
1. A conditional syllogism is one which has a conditional proposition for its major, or for its minor, or for both. If both the premises are conditional, the conclusion must be so too; if, however, the major only is conditional, it is termed conditional ex parte.

antecedent.

As,—If Napoleon was the Scourge of Europe, consequent.

he deserved to be banished.

But he was the scourge of Europe,
\[\therefore\] He deserved to be banished.
In conditional syllogisms there are two *modes of procedure*.

1. From the position of the antecedent to the position of the consequent. This is called the *modus ponens*, or constructive mode, because you affirm in the consequent the truth of what is stated conditionally in the antecedent, and thus get an affirmative conclusion. The syllogism above stated is an instance of this. But,

2. We may proceed from the *remotion* of the consequent to the *remotion* of the antecedent. This is called the *modus tollens*, or destructive mode.

**antecedent.**

Thus — If no bigot is a wise man,

**consequent.**

No bigot is worthy our notice.
But no bigot is a wise man,
∴ No bigot is worthy our notice.

Here from the negation of the consequent we conclude the negation of the antecedent, and thus get a correct *negative* conclusion.

The illicit modes of reasoning are, to proceed from the position of the consequent to the position of the antecedent; or from the remotion of the antecedent to the remotion of the consequent.

1st false procedure.

**antecedent:**

If great philosophers be virtuous, they will be admired.

**consequent.**

But great philosophers are admired,
∴ They are virtuous men.

2nd false procedure.

**antecedent.**

If Catiline betrayed his fellow conspirators,

**consequent.**

he was a wicked man.
But he did not betray his fellow conspirators, :: He was not a wicked man.

45.

2. A disjunctive syllogism is one which has for its major premiss a disjunctive proposition affirmative in quality.

Here, as in the conditional, there are two legitimate ways of proceeding —

1. From the position of one of the parts to the remotion of all the rest. Or,

2. From the remotion of all the rest of the parts, to the position of some one of them. — Thus, taking the disjunctive proposition —

Caius lives either in Rome, or Naples, or Florence, we may affirm one part; viz.

that he lives in Rome; —

and from this affirmation we negative all the rest — :: He lives neither in Naples nor Florence.

Or we may deny all the parts but one,

He lives neither in Naples nor Florence;

and conclude that —

He lives in Rome.

There is yet another form of the disjunctive syllogism, viz., that in which from the remotion of each of the parts, the remotion of the whole is concluded. Thus Cicero argues epichoristically respecting pain—

If pain is to be feared, it must be so either because it is long in duration, or intense in degree, —

But it is not so when long in duration (for then it cannot be severe), nor when intense in degree (for then it cannot last long); :: Pain is not to be feared at all.
46.

DILEMMA.

The dilemma is a syllogism that partakes partly of a conditional, and partly of a disjunctive character.

It is an argument such that when all the suppositions of a case are stated, any one of them puts the opponent to inconvenience.

The most usual, and the most legitimate form of it, however, is—when there are only two suppositions, either of which, being granted, overthrows the position maintained by the opposing party. Hence the origin of the expression, "to fix a person on the horns of a dilemma."

Thus we may state Cicero's argument respecting the power of a wise man to endure pain in the following way:—

If pain is either short in duration, or moderate in intensity, a wise man can bear it.

But it is always either short in duration, or moderate in intensity;

Therefore a wise man can always bear it.

The validity of the dilemma, as an argument, rests fundamentally upon a correct enumeration of parts in the statement of the conditions.

Thus if I were to argue—

If a man be a Christian he worships the true God;
If he be a heathen he worships an idol:
But he must be either a Christian or a Heathen;
Therefore every man must worship either the true God or an idol:

there would evidently be an error in the enumeration of conditions. Some men might not be either Christians or Heathen: they might be Mohammedans or Atheists.

In the same way as we have seen respecting conditional syllogisms, so the dilemma may be either con-
structive, or destructive. It may be either simple, having a categorical conclusion, like the first of those above quoted; or complex, having a disjunctive conclusion, like the second.

Note.

The Classification of non-Categorical Syllogisms may be presented in the following scheme.—Non-Categorical Syllogisms are:

I. Irregular.
   a Enthymeme.
   b Epicherema.
   a + b Sorites.

II. Hypothetical.
   a Conditional.
   b Disjunctive.
   a + b Dilemma.
IV. ON FALLACIES.

47.

In discussing the nature and mechanism of the syllogism, we have shown what kind of arguments are valid and what kind inconclusive as to their form. Sometimes, however, we meet with arguments which in form are perfectly correct, but yet lead to a wrong conclusion. It is these that we have now briefly to discuss, under the head of Fallacies.

Most of the writers on Logic divide the different kinds of fallacious reasoning into two classes, viz. Fallacies in dictione, and Fallacies extra dictionem. The first class, as the name indicates, includes all those cases where the fallacy lies in the expression; the second class includes all those, where the fallacy lies in the subject-matter.

48.

FALLACIES IN THE EXPRESSION.

Under fallacies in expression we designate all those cases of incorrect reasoning, which arise from the ambiguity of particular words or expressions. We may divide them, for convenience' sake, into five different classes, which we shall briefly explain in order.

The first two species of this class of fallacies (which may easily be explained together) are the "Homonymia," and the "Amphibolia." The former arises from one of the words which compose the middle term being in itself equivocal, i.e. capable of more than one signification; the latter from the middle term being a
phrase, rendered doubtful by its position or grammatical construction.

The instances in which particular terms assume an equivocal aspect are very numerous. Sometimes (e.g.) words having accidentally the same form are totally different in meaning; other terms, again, are not infrequently chosen to express technically some precise and restricted idea, when in popular use they are employed in a more loose and general sense, the one being termed the first, the other the second intention. Similar indefiniteness arises from the use of analogical and elliptical words, all of which, when employed as middle terms in a syllogism, give rise to the logical error which we express by Homonymia. A single and glaring instance (since principles are best seen in extreme cases) may suffice to exemplify this fallacy. Employing the equivocal use of the word "Christians," the following syllogism might be formed from it:—

All Christians are good men,
All Englishmen are Christians,
∴ All Englishmen are good men.

The different forms of Amphibolia are not less numerous. Ambiguity (e.g.) arising from the two different cases in which a word might be understood in the construction of a sentence is not unfrequently found in modern, and far more frequently in the ancient languages of Greece and Rome. The relative clause again may often be referred to two different antecedents, and indeed any kind of subordinate clause, is very often applicable to different parts of the whole passage in which it stands. Fallacies arising from such causes as these may be easily solved by showing that in every case the syllogism has really two middle terms, and that there is, therefore, no standard of comparison by which the agreement of the major and the minor may be tried.

The two next Sophisms "in dictione" are those
called the fallacies of Composition and Division. These sophisms, which are the most important of their class, arise from employing the middle term once distributively and once collectively, and thus destroying the standard of comparison. In the former case, (i.e. in the fallacy of Composition,) something is established of the separate individuals in a class, and then inferred of that class taken collectively. This may be familiarly illustrated by the well-known fable of the father, who to impress upon his sons the importance of union and harmony amongst themselves, showed them that each separate stick of a bundle might be easily broken, while the whole together were irresistibly firm. The fallacy of Composition would have led them to the conclusion, that if all the rods were fragile taken separately, they would be equally so when bound together. The fallacy of Division is the reverse of this; and, to take the same illustration, it would have led to the conclusion, that if the bundle above mentioned were incapable of being broken when taken collectively, the separate rods would present the same resistance to our physical efforts. This latter sophism frequently arises from the ambiguous use of the word "ALL," which may be taken both distributively and collectively, as in the following syllogism.

All the angles of a triangle are equal to two right angles.
A, B, C, is the angle of a triangle,
\[ \therefore \] A, B, C, is equal to two right angles.

These cases may easily be solved by enquiring in the outset, in what precise sense the word "all" is to be employed.

The logical fallacy in these two sophisms is specifically the same as in the last two, arising, that is, from the ambiguity of the middle term. The middle term, it will be seen, is taken distributively in the major and collectively in the minor when we err by Composition; while the case is precisely reversed when
we err by Division. In both cases therefore two middle terms are involved, which vary essentially in their meaning.

The 5th and last kind of Sophism in this division is that termed—"fallacia figuræ dictionis."

The most common form in which this fallacy presents itself is in the case of paronymous words, in which two terms of the same root, and closely connected with each other etymologically, are employed, as though on that account identical in meaning, when through conventional use their actual meaning has become considerably modified. The following syllogism is an example of this error:

None but immortal beings will live for ever,
But all men are mortal,
∴ No men will live for ever.

Here through conventional usage the word immortal is applied to the soul, and mortal to the body; so that the words not being really opposed, cannot be substituted for each other as in the above syllogism. Other instances of the "fallacia figuræ dictionis," occur from the use of a word first in its etymological and then in its popular sense; or from employing a grammatical termination so as to render the real meaning of the sentence ambiguous. To these some logicians add sophisms which arise from employing figurative language, and reasoning upon it as if it were real; but these may, perhaps, be better classified as instances of false parallels, which we shall mention under the next division.

Viewing this general division as a whole, it is evident that all the cases might be reduced to the head of ambiguity, since it is in an ambiguity of one form or other, that the error in every instance consists. Or to render the generalization rather more definite, and distinctive, we might form them into two classes, one in which the ambiguity arises from the word, and
the other from the phrase, and thus by an extension of the first two species, include under them the remaining three.

49.

FALLACIES IN THE MATTER.

We proceed next to the fallacies "extra dictionem," or fallacies in the thought itself, a class far more frequently to be met with, and by no means so easy in the majority of instances to be detected.

These will fall, according to Aristotle's arrangement, under seven heads, which we shall take up successively, in order at once to explain their nature, and the various forms under which they are found.

1. The first of these is the "fallacia accidentis." In forming a class out of individuals, we always have some particular point or points of resemblance, by virtue of which we unite them. These individuals, however, may still have many points of dissimilarity which do not affect the classification, and which are usually called accidents. Now we often affirm of a class of things generally something that is only true of it accidentally, and, reasoning upon this affirmation, arrive very soon at a false conclusion. Thus it is generally true that Lions are fierce animals; but we cannot conclude from this that Lions, which have been under a particular course of training, are so. This is an accident, which modifies the general conditions of the case. It is by a fallacy of this kind that all the errors and weaknesses of a party are often attributed to an individual simply because he happens to belong to it. In all such instances we have the old fallacy of a two-fold middle term; and need only point out the ambiguity which arises from using it in one instance particularly, and then universally (thus destroying the uniformity of the standard by which the extremes are to be tested), in order to solve the case.

2. The next fallacy is that of reasoning " a dicto
secundum quid ad dictum simpliciter," which is in fact only the reverse of the fallacies accidentis, and is resolved on precisely the same principle. The error here lies in reasoning, not as before, from the absolute to the conditional, but from the *conditional* to the *absolute*; or in other words, in inferring that to be truly predicated of a subject when viewed *absolutely* which is true of it only upon the supposition of some modifying conditions.

Thus, were I to argue that, because arsenic is not unfrequently used in medicine to preserve health, it is not destructive of human life, I should be inferring a general conclusion of arsenic taken in its whole essence from a particular case in which the essential qualities of the poison are modified by other accidental additions. Here, as before, the error lies in there being really four terms to the syllogism. Thus if I were to argue, that because the natives of Europe are white men, a Hottentot born in Europe must be white also, I should be taking the middle term, "native of Europe," in two different senses, one meaning the *natural* inhabitants of this quarter of the globe, the other including any one who might accidentally be born in it.

3. We come next to a very important sophism, termed "ignoratio elenchii." The error in this is of a nature entirely different from any other we have before noticed. The syllogism may be in itself correct, the conclusion following properly from sound premises, while yet that conclusion is not applicable to the real point in question.

An elenchus is properly a syllogism the conclusion of which is the contradictory to the conclusion of another which it is our intention to refute; and it is evident that if the point established be not contradictory to the one we are opposing, they may be both true, or both false, without materially interfering with each other.

*Sometimes an argument is stated incorrectly, and*
then triumphantly refuted; which is popularly called—setting up a man of straw, and then knocking him down. Sometimes the very point in question is mistaken and then disproved—a case exceedingly common in almost every kind of moral argumentation. Another instance of ignoratio elenchi, is when an argument is drawn from a case supposed parallel, but not really so; as when Berkeley proves the possibility of there being an invisible agency at work in the creation, from the existence of animal spirits, which he takes for granted to be actual though invisible realities. Errors arising from the use of figurative terms as though they were literally true, may be ranged likewise under this head.

The last kind of this species of fallacy is that of imputing consequences and then arguing from them to the detriment of our opponent. In every case of ignoratio elenchi we must show what the real question is, and point out, when we have placed the conclusion of the elenchus by its side, that the one does not logically contradict the other.

4. The fourth species of fallacy is one which presents itself under a great variety of forms, and is, perhaps, more frequently than any other employed for purposes of false and deceptive reasoning, namely, the petitio principii, or begging the question. The essence of this fallacy lies in taking for granted the very thing to be proved, or assuming some point which equally requires to be established by additional evidence. In every argument it is required that there should be a middle term, and that this should be something with which the extremes may be advantageously compared, in order that we may estimate by it, as a known standard, their comparative agreement or disagreement. Hence the middle term must be something better known than the extremes, otherwise it can be of no utility as a test.

When, therefore, we take a medium of proof, which
is quite as little known, and requires quite as much demonstration as the very point in question, we are guilty of one form of the petitio principii. A similar fault is committed when the middle term, though differently expressed, is really identical with one of the terms of the question; and this is peculiarly liable to take place in a language which, like our own, is compounded of the radical parts of two or three others, so that we can readily express the same idea by employing totally different phrases. We may include, indeed, under the petitio principii all instances in which either of the premises in an argument are insufficiently supported, and consequently unduly assumed. The sophistry involved in such reasoning is often by no means easy to detect, especially when it occurs in the enthymemetic form, and the suppressed premiss is the very point in which the fallacy lurks. A remarkable modification of this fallacy is that termed reasoning in a circle, i.e., when two propositions are made mutually to prove each other; each being one of the premises from which the other is deduced. This error is often committed by Christian apologists who prove the truth of the Bible from the doctrines it contains; and then, prove the truth of the doctrines from their being in the Bible.

5. The fifth species of fallacy is that termed the non causa pro causa, which, like the last, presents itself under several modifications. In some instances a cause is assumed which has no title to be called a vera causa at all, i.e., which has no real observed or demonstrated existence. Such is the case when men amuse themselves with framing hypotheses upon slender grounds, and then reduce to them as general principles or laws, observed facts in the operations of nature.

Another form of this fallacy is that termed non talis causa pro tali, or assigning a cause which is insufficient to account for the effect. Under this head may be
classed the objections made against Christianity, from the feuds and animosities which have often accompanied it, since it is totally unfitted to account for them without the supposition of the other and more real causes existing in human nature. A further case under this same head is that termed, post hoc ergo propter hoc, or supposing two things to be mutually cause and effect, because they are respectively antecedent and consequent in time to each other. The two former modes of this fallacy are evidently cases of petitio principii, and may be shewn to be inconclusive, from the gratuitous nature of the premises; the last is a species of the fallacia accidentis, and may be solved on the principle there pointed out.

6. The sixth fallacy (fallacia consequentis) is the converse of the last. There the antecedent was false, here the consequent is so. For example, we may build an argument upon the converse of a proposition which is not logically converted, or violate in a similar manner the laws of opposition and illation, and thus arrive at a conclusion far from being warranted by the premises. The way in which this fallacy is to be solved is, by pointing out the proper rules of conversion, etc., which are violated, and showing thus that the conclusion is not necessitated. Thus, were a Russian to argue that his country is far happier to live in than our own, because there are fewer taxes to be paid to the government, we might show that a country without taxes is not opposed to an unhappy, or a country with taxes to a happy one.

7. The seventh and last sophism which we have to consider, is that termed fallacia plurium interrogationum, in which a complex question is proposed in such a manner as to elicit, if possible, a simple or categorical answer. If the sophist succeed in this, on whatever side the answer may be returned, he can employ it equally to silence his opponent. This fallacy, whether containing two or more subjects or two or
more predicates, may be exposed, by pointing out the separate parts of which the question consists, and then giving a disjunctive answer.

Thus, were a sceptic to ask whether all such forms of religion as Heathenism, Christianity, Mohammedanism, etc., are not mere delusions of a superstitious mind, we could not answer him categorically, but should have to separate the subject of the question into its component parts, and then answer each of them singly.

In viewing this second division of fallacies as a class, one of two kinds of errors, we observe, occurs in every instance; either the premises themselves are faulty, or the conclusion, though deduced from correct premises, is vicious or irrelevant to the question. The great points, therefore, upon which we should keep our eye fixed, (as those in which sophisms are most liable to lie concealed,) are, first, to see that the middle term is unambiguous, guarding thus against the fallacies in dictione; secondly, to see that the premises are really legitimate data; and lastly, to be assured that the conclusion is correct and relevant to the subject in dispute.

50.

CONCLUSION.

We have now given a brief sketch of the principal points usually included in the Science of Formal Logic. In doing so we have shown the nature of Abstract Ideas—their varieties and characteristics. Next we have discussed the Proposition, and pointed out all the different changes which it may undergo. And, lastly, we have exhibited the laws of correct reasoning, as based upon the nature of abstraction and generalisation.

It is important that the student should bear in mind exactly what is proposed by this investigation. Some have imagined that Logic includes the whole of the
processes employed for the investigation of truth, and expounds *every method* by which we can arrive at a conclusion. Whatever grounds might be assigned for giving such an extension to the term Logic taken alone, yet assuredly there can be no reason for putting such an interpretation upon the term *Formal Logic*. Formal Logic (of which alone we have proposed to treat) has a perfectly distinct field of its own: it embraces simply the laws of generalisation, the modes in which we express our judgments, and the principles of accurate *deduction*.

It should always be kept in mind that there are two applications of the power of thinking, essentially different from each other. We may employ our reason either in investigating new truths; or we may employ it in criticising what is already virtually known, in arranging it into due order, and in drawing particular inferences from the data actually before us.

Now as to the apprehension of new Truths, there are many ways in which we arrive at them. We may do so through the medium of the senses,—that is by means of personal experience; or we may do so by means of the testimony of others; or we may do so by induction from facts presented to us either through experience or through testimony. All these different methods of investigation form distinct objects of study. We may lay down the canons of Experience; or arrange in order the laws of Testimony; or pursue the philosophy of Induction, each as a subject by itself. These questions, however, have nothing directly to do with Formal Logic; *they* are all different methods of *productive* thought: whereas Logic is simply *critical* and *analytic*.

It has been not unfrequently taken up as an objection against the utility of the syllogism, that it does not teach you to arrive at new truths, but simply draws out into a definite conclusion what is already contained in the premises. It might as well be ob-
jected to Grammar that it does not teach us new languages or help us to speak our own. Grammar teaches us the general laws of language, and Logic teaches us the general laws of thought. The one as well as the other is a mental discipline that tends not to new discoveries, but to clear the mind in the use of the knowledge it has already in its possession.

And this is an end assuredly which it is of the utmost importance to aim at. The mere possession of a vast multiplicity of ideas — of facts — of experiences is by itself of comparatively little use. To make them of use we need that degree of mental discipline which enables us to govern facts, to harmonise them, to combine them into a body of connected truth.

We do not promise, accordingly, from the study of Logic to unfold any new fields of positive knowledge; we do not pretend either to give any direct organum for the investigation of new truths; but we do promise to afford some amount, at least, of that mental discipline which shall give precision to the intellect, a discriminating power to the judgment, and a facility for arranging and systematising our ideas. Those who think this of equally great importance with the accumulation of the mere crude material of truth, will not regret the time and the labour that is spent upon what is intended merely as a Mental Discipline.
EXERCISES.

SECTIONS 1—15.

1. Explain the exact meaning of the following words, illustrating each by examples:—
   Sensation, Perception, Attention, Memory, Imagination.

2. What distinct mental operations depend upon the use of Language, and why? Explain the nature of Generalisation, and Abstraction.

3. What is meant by the Understanding? and what by the Laws of Thought?

4. What is the purport of Logic; and what the use?

SECTIONS 16—20.

5. What is meant by a Concept; what is its origin, and what its nature?

6. Classify "Terms," giving examples of each kind, and showing in what their difference consists.

7. What is meant by the Extension, and what by the Comprehension of a Term?

8. Arrange the following terms; 1st. in the order of their Extension, and 2ndly, in the order of their Comprehension:
   Rapacious animal—Lion—Vertebrate animal—Black Lion—Animal—Quadruped—Sensible object—Substance—Native of Africa.
SECTION 21.

9. What is meant by the Predicables? Explain what is meant by Genus—Species—Differentia—Proprium, and Accidens; with examples of each.

10. What is meant by a Summum Genus, and to what is it opposed? Give examples of both.

11. What is meant by Species infima, and to what is it opposed? Give examples of both.

12. Give the different varieties of the proprium, and the accidens, with examples of each.

SECTION 22.

13. What is meant by the Categories? What is Aristotle’s classification? and what is its worth?

SECTION 23.

14. What is the use of Division? What Rules should be observed? What faults avoided?

15. Explain the different senses in which the term “whole” is employed.

16. When is a division inadequate? when indistinct? when a cross division? and when not arranged according to proximate parts?

SECTION 24.

17. Of what parts does a perfect logical division consist? Why do a Summum Genus, and a Species infima not admit of definition?

18. Define logically the following terms: A proposition—An Army—Astronomy.

SECTIONS 25, 26.

19. Explain the parts of which a logical proposition consists.

20. How are propositions divided as to Substance?
SECTIONS 27—30.

21. What is meant by the Quality, and what by the Quantity of a proposition?

22. By what special means are the quality and the quantity of propositions expressed?

23. How is the Quantity of the Predicate determined? Show the reason of the case.

24. Denote the following propositions, as to their quantity and quality, by the proper vowel symbols:
   - All negroes are black.
   - Some birds cannot fly.
   - Many men are unwise.
   - No fools are esteemed.
   - Not many intemperate men live long.
   - Ants are wise insects.
   - Currants are ripe in July.
   - Wherever A is there is B.

SECTIONS 31, 32.

25. What is meant by Subalternation; and what rules are to be observed for its accurate performance?

26. What is meant by the Conversion of a Proposition; and what are the different modes of Conversion?

27. In what different ways may each of the propositions denoted by A, E, I, O, be converted?

28. Convert the 8 propositions in Question 24 according to the proper rules.

SECTION 33.

29. How many kinds of Opposition are there? Explain them.

30. State the Laws of opposition.

31. State the Opposites of the following propositions and show in each case what kind of opposition it is:
   - Some quadrupeds are not rapacious.
   - All men are mortal.
   - Some wise men are not wealthy.
   - Homer wrote the Iliad.
   - No government is perfect.

E 3
SECTION 34.

32. State and explain the different kinds of Compound Propositions.

SECTIONS 35, 36.

33. What is a Syllogism; and of what Elements does it consist?

34. On what Laws does the conclusiveness of the Syllogism depend? Explain the "Dictum" of Aristotle.

35. Express the following passages in the form of Syllogisms; and point out in each case what is the major, the minor, and the middle term:

Many things allowed amongst men are hateful in the sight of God, because every thing sinful is hateful in his sight.

Many Christians have practised persecution, and therefore could not have been good men.

The ancients believed in magic, and must therefore have been frequently led astray.

SECTION 37.

36. State the General Laws of the Syllogism; and show the reason of them.

37. Which of the six rules do the following Syllogisms violate, and why?

Willows prefer a moist soil,
Alders are not willows,
∴ Alders do not prefer a moist soil.

Some literary men have been exiled,
Some kings are literary men,
∴ Some kings have been exiled.

Men are not quadrupeds,
Horses are not men,
∴ Horses are not quadrupeds.
Many men are wise,
Europeans are men,
∴ Europeans are wise.

Many senators have been philosophers,
Many philosophers have gone mad,
∴ Some senators have gone mad.

The innocent should be protected,
This person should be protected,
∴ This person is innocent.

Every rational agent is accountable,
Brutes are not rational agents,
∴ Brutes are not accountable.

38. Which of the following Syllogisms would conclude correctly, and which incorrectly, and why?
E A E—E A A—A I I—I A A—O A O—E I O—I E I
—A I I—A O O.

SECTIONS 38—40.

39. What is meant by Mood? How many modal combinations are possible, and how many legitimate?

40. What is meant by Figure? How many figures are there, and how many available moods in each figure?

41. Give the Mnemonic word answering to each of the following Syllogisms:

No animal is a stone,
Every man is an animal,
∴ No man is a stone.

Every man is an animal,
Some living things are not animals,
∴ Some living things are not men.

Every animal has feeling,
Every animal has life,
∴ Some living things have feeling.

Ex 4
Every man is an animal,
No animal is a stone,
\[ \therefore \text{No stone is a man.} \]

No animal is a stone,
Some bodies are animals,
\[ \therefore \text{Some bodies are not stones.} \]

Things which are equal to the same are equal to each other,
A and B are equal to the same, *viz. to C,*
\[ \therefore \text{A and B are equal to each other.} \]

SECTIONS 41, 42.

42. Give the special rules of the 1st, 2nd, and 3rd figures respectively, and prove them.

43. In what respect is the 1st figure superior to the other three?

44. Show in what mood and figure each of the following syllogisms is drawn; and that each conforms to the special rules of the figure:

No vicious habit ought to be indulged,
Some vicious habits promote a temporary interest,
\[ \therefore \text{Some things which promote a temporary interest ought not to be indulged.} \]

All true penitents will find mercy,
Some true penitents have been great sinners,
\[ \therefore \text{Some great sinners will find mercy.} \]

Libellers delight in hurting the feelings of others,
No good man will delight in hurting the feelings of others,
\[ \therefore \text{No good man is a libeller.} \]

Many philosophers have contradicted their principles by their practice,
All who contradict their principles by their practice are dishonest,
\[ \textit{Some dishonest} \text{ persons have been philosophers.} \]
45. What is Reduction and how many different kinds of it are there?

46. Show how the mnemonic lines Barbara, Celarent, &c. guide us in reducing syllogisms of the 2nd, 3rd, and 4th figures to the 1st.

47. Reduce the syllogisms in Quest. 43 to some mood of the 1st figure.

48. Give an account of the method by which Sir W. Hamilton proposes to simplify the doctrine of mood and figure.

SECTION 43.

49. What is an Enthymeme? and what an Epichereum? Give examples of each.

50. In the following examples of reasoning supply the suppressed premiss; and form them into regular syllogisms:
   It is already day, because the sun shines.
   We shall hear thunder, because there was a flash of lightning.
   France is misgoverned, and therefore is unhappy.
   The Epicureans cannot be considered true philosophers, because they did not consider virtue to be essentially good.
   Ireland is distressed; therefore it is misgoverned.
   The star twinkles; and is therefore a fixed star.

51. Expand the following Epichereum into two or more separate syllogisms:

   Every thing the knowledge of which we obtain by intuition is true, because upon such intuitions all reasoning and all knowledge are primarily based. But our mental identity is a fact which we know by intuition, since the belief of it is immediate, irresistible, universal; therefore the fact of our mental identity is grounded on Truth.

52. Place the following passages in the order of a regular Sorites:

   Onesimus was a resident at Colosse; because he was the servant of Philemon, who was a hearer of Archippus, the minister of Colosse.
This doctrine is true, because it is maintained by A. B. who is a divine of the Church of England—a church whose doctrines are in accordance with the Scriptures.

53. Show that the reasoning in the 13th prop. of the 1st Book of Euclid may be put in the form of a Sorites.

SECTIONS 44, 45.

54. What is a conditional and what a disjunctive syllogism? Show the two legitimate modes of illation in each.

55. In the following conditional syllogisms show which are and which are not legitimately drawn and why:

If Judas was not rightly made an apostle, he deserved to be rejected; but he was rightly made an apostle: therefore he did not deserve to be rejected.

If riches be the supreme good, they ought to be the chief object of human desire; but they ought not to be the chief object of human desire: therefore they are not the supreme good.

If great poets be virtuous, they will be highly admired; but they are highly admired, therefore they are virtuous men.

56. Put the following arguments into the form of a disjunctive syllogism, and prove that you have drawn them correctly:

If the earth be neither eternal, nor made by chance, it must be the work of an intelligent being; and there are numerous grounds on which the first two suppositions may be shown to be absurd.

Rebellion is sometimes justifiable, because we sometimes have the alternative presented to us of obeying princes contrary to conscience or of rising against them.

SECTION 46.

57. Explain the nature of the dilemma, and show on what fundamental principle its validity rests.

58. State the following examples in the form of a dilemma:

The story told by the Roman soldiers about the stealing
of our Lord's body from the tomb by the disciples is absurd; because if they were asleep how could they know that it was so; and if they were awake why did they not prevent it?

Either you did not know the way when you undertook to be my guide, or you did. On neither supposition will I pay you. For if you knew the way you have made me too late purposely; and if you did not know the way you were dishonest in undertaking to guide me.

Clergymen who have no cure of souls are without excuse; for if they are capable of the office they ought to fulfil it; and if they are incapable of it they should never have undertaken it.

SECTIONS 47—49.

59. Give a classification of Fallacies, and explain on what principle the classification proceeds.

60. Solve the following Fallacies, and show to which class of Sophisms they belong:

Hector slew Patroclus,
Achilles slew Hector,
\[\therefore\] Achilles slew Patroclus.

Meat and drink are the necessaries of life,
This man spends all his money on meat and drink,
\[\therefore\] He spends all his money on the necessaries of life.

He who calls you an animal speaks truly,
He who calls you a goose calls you an animal,
\[\therefore\] He who calls you a goose speaks truly.

What I am you are not,
I am a man,
\[\therefore\] You are not a man.

No evil should be allowed that good may come,
All punishment is an evil,
\[\therefore\] No punishment should be allowed that good may come.

The Bible commands us to honour rulers,
The Czar of Russia is a ruler,
\[\therefore\] The Bible commands us to honour the Czar of Russia.
The Gospel promises salvation to Christians,
Some wicked men are Christians,
\[\therefore\] The Gospel promises salvation to some wicked men.

Murder should be punished by death,
The soldier is a murderer,
\[\therefore\] The soldier should be punished by death.

The plays of Shakespeare cannot be read in a day,
Macbeth is a play of Shakspeare,
\[\therefore\] It cannot be read in a day.

Five is one number,
Three and two are five,
\[\therefore\] Three and two are one number.

All the Reformers were zealous Protestants,
Marcus Aurelius was a Reformer,
\[\therefore\] Therefore he was a zealous Protestant.

Leaving off animal food has improved his health greatly; because he has never experienced a headache since.

The child of Themistocles governed his mother,
The mother governed Themistocles,
Themistocles governed Athens,
Athens governed Greece,
Greece governed the world,
\[\therefore\] The child of Themistocles governed the world.

Nature abhors a vacuum, therefore the water rises in the pump.

The nature of heavy things is to tend to the centre of the universe, and of light things to go off from it.

Now experience shows that heavy things tend towards the centre of the earth, and that light things go off from it.
\[\therefore\] Therefore the centre of the earth and the centre of the universe are the same.

All Christian doctrine is contained in Scripture,
\textit{But infant} baptism is not mentioned in Scripture,
\[\therefore\] Infant baptism is not a Christian doctrine.
We know that there is a God because it is so stated in the Bible; and we know that the Bible is true because it is of divine origin.

A. B. must be a fanatic because he is a Mormonite.

The French are a light-hearted people,
A. B. is a Frenchman,
· · · Therefore he is light-hearted.

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