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PREFACE-

In offering a new system of philosophy to the scientific world, the author is aware that many will at the outset as Omer Pasha did of the Alexandrian Library, "If it contain the Koran, we have it already, and whatever else it may contain is not worth having." We can only remind such persons that the present age is one of free inquiry, that the human mind at best is very feeble and easily deceived by appearances, and that though we may be contented and confirmed in our opinions, which are supported by the names of distinguished philosophers; yet our condition, perhaps, may be no more happy than that of Pollock's rustic, who was confirmed in the belief that the vinnh line about was the world's extreme. Fortunately for the human race, however, there is a class of men in America and Europe, whose reflections teach them, that there can be no great advance in civilization without an increase of knowledge in science. To such persons the author must look for a fair examination of the present work. And in calling the attention of seekers after scientific truth in a preface, little more can be done by an author than to promise that, in the author's opinion, a thorough perusal will repay the reader.

The thoughts contained in this book have been grained by much labor, and have not been set down without much reflection. The subject is a profound one; and it is, indeed, to the matured philosopher, whose mind has been grappling with intricate scientific questions, and who can command and concentrate his thoughts, that, in the first instance, the value of new scientific truths must be perceived and appreciated. To such matured minds we say, read our book carefully, and speak your minds freely respecting its merits. For we believe, that the philosophic seeker for truth, of the present and future ages, will find in it sufficient immutable and valuable truth to approve and justify the time and labor spent by the author in his attempt to correct error and to open the gates of scientific truth to mankind. The Author.

EtJREKA, California, January 2d. 1879.
"Philosophy and the intellectual sciences like statues," says Bacon, "are
adorned, and celebrated, but are not made to advance; nay, they are frequently
vigorouss in the hands of their author, and thenceforward degenerate." This
remark of Bacon's is literally true of Logic; which word will probably
suggest to the reader that class of studies at the present time more nearly
related than any other to the subject-matter of this book. And in attempting
to explain something new and unknown to the reader, we are frequently
obliged to make ourselves understood by reference to something already
known. In our introduction of the reader to the explanations and substance
of the science which we have endeavored to exhibit in the subsequent pages,
therefore, we would ask and expect that he has some knowledge of the stand-
ard works upon Logic, among which that of Archbishop Whately is as able a
specimen of the received system as any; and as it is concise and contain
but little irrelevant matter, it is therefore to be preferred to any other. We
danot, however, insist that the following pages can not be understood with-
out such previous acquaintance with the works of others. We have endeav-
ored to make this treatise as elementary as possible; so that it may be in
itself sufficient to convince and instruct the reader in its various doctrines.
Yet such previous acquaintance with the popular works on Logic will have
brought any one to some appreciation of some of the difficulties in the way,
and therefore he will be better prepared for the investigation. And we do
positively insist that the reader shall come to the consideration of this book
with a trained mind.

On the other hand we do not object to the popular systems of Logic
because that science has not in the succeeding ages from Aristotle, its author,
unraveled itself into greater number of details, or varied its elementary prin-
ciples. True principles are immutable, and to depart from them is to fall into
error. But the popular systems of logic, in our estimation, possess no value
except in disputations; they are in fact what Archbishop Whately says of
logic in general, "E. tirely conversant about language." That the popular
systems of Logic make the analysis, and explain the true processes of the
mind in reasoning, we do not believe, and therefore we do not regard them as
of any value in assisting any person in his search after truth. In driving
men by their own words to admit what they already know to be true, i.e., in
argumentation, they may be of value; but in making inferences from tr
known to truths unknown, the mind does not proceed upon the principles
set forth in the Aristotelian methods, and therefore these methods are of no
value to science. In the language of Bacon "They force assent not things."
Although the dialects of Aristotle have been before the world for many cen-
turies, yet no one, however well acquainted with the system, has advanced to
one new truth in science by the method therein laid down. And if logic is
not a peculiar method of reasoning, but the method upon which all true reasoning proceeds, as contended by Whaley and others, then the great advance which has been made in the sciences must have been made without reasoning at all, or else the method of reasoning is not such as it has been stated and explained by these authors.

But although the popular systems of logic are of no value in assisting to lay the foundations, or to rear the superstructure of the physical, abstract or mental sciences, yet for the purposes of adorning and giving force to speech they are not without value. Archbishop Whately regards rhetoric as the offshoot from logic; in our estimation all that is valuable in the popular systems of logic belongs more properly to rhetoric than to any other science. It is true that whenever we reason i.e. we make inferences from truths known to truths unknown, certain processes take place in the mind, and that these processes are alike in the minds of all men who reason correctly. It is also true that the popular systems of logic explain with tolerable correctness the manner of wording our premises and conclusions in what is called ratiocination. And to get even thus far is an acquisition of no small value. But it is somewhat strange that writers on logic of the most brilliant talents, who so frequently warn us against the liability of being imposed upon by words, should yet never have penetrated beneath the words to the things that have brought about these words with their manner of usage. Words are used in every science; but no science constructed upon words can touch the limits of things in mental or physical nature. The processes of the mind in reasoning leave no sensible trace behind them; words do not stand as sensible signs of these processes. The mind by its processes forms words, but the processes themselves are at the bottom, and they lie deeper than the words. **A proposition,** says Whately, "is defined logically a sentence indicative i.e. affirming or denying; (this excludes commands and questions) sentence being the genus and indicative the difference, this definition expresses the whole essence; and it relates entirely to the words of a proposition." Any one can easily see that the above definition is grounded entirely upon grammatical distinctions, and as stated by Whately, "It relates entirely to the words of a proposition."

To make a scientific analysis and explain the processes of the mind in reasoning require a different treatment and mode of investigation from that hitherto pursued by writers upon logic. And we may in truth say that in the
"The unassisted hand," however, "and the understanding left to itself possesses but little power. Effects are produced by the means of instruments and helps, which the understanding requires no less than the hand." And in looking after helps for the understanding, we would naturally inquire by what means any one, who had made discoveries in science, had been assisted in his efforts. If any one should see a mathematician calculate the distance to a certain object, or tell the height of a tree without measuring it, and he find the result to be as the mathematician had stated, he would very naturally inquire how such knowledge could be obtained; by what means could such conclusions be reached. And every one knows that the science of mathematics is a most powerful instrument for solving those problems of nature which come within its province. But the science of mathematics itself has been discovered and its truths have been brought to light by certain processes of the mind And those processes of the mind, which have brought to light some truths in any given case, will, if exercised again in like manner, bring to- light other truths of a like nature. The mind certainly possesses the power to gain knowledge by some method, and were this method certainly known and clearly explained, it could be used to advance our knowledge in science, unless all the subjects to which it is applicable are exhausted. But the greater number of the sciences are confessedly yet in their infancy, and His progress, which is made in them, seems to proceed in most iustances.~

But if the true processes of reasoning were understood, reasoners would certainly be guided to advantage by such knowledge, and they would use this knowledge as an instrument to assist their understanding in solving problems in particular sciences. To assert that there is a science of reasoning and yet to say that this science is of no utility in advancing those sciences, which arc built up by reasoning, is absurd. All men admit that the greater part of our knowledge is gained by reasoning, and reasoning certainly does not proceed by chance— but upon some determinate process; and unless these be legitimately pursued our inferences will be fallacies.

Now the science of reasoning ought to inform us when we are in pursuit of any truth, which can be gained by reasoning, what method we must pursue in order to gain that truth: and if the S3 llogism as explained by the writers upon logic be the method of all true reasoning, then we must find a major and minor premises which will lead us to the truth in question. But
According to all the authors upon logic, when we lay down our major premise we virtually assert the conclusion; and hence we must virtually gain the knowledge of the desired truth before we can lay down the premises which shall conduct us to it. We repeat, however, that the popular systems of logic, are not only, not scientific works in themselves, but that they are of no use to science. And hence if we expect to lay sure foundations upon which every edifice can be built in all their beauty of symmetry, we must have after a better understanding of the reasoning processes than writers upon logic have been able to exhibit hitherto. This we will attempt to do in this book. And we are aware that this task is not only in itself a very difficult one, but that the prejudices of scholars are against us. Bacon's attempt to introduce the inductive system of philosophy has cleared away in some measure the prejudices of many in xvov of the Aristotelian method. But Bacon did not perfect the inductive system, and although he left it and there very.

VartefiliSflife blrlhr Aftef pbcesstes of'HheUind, yet h6 dlidiobf ^yst^to^rtze

1Miitei*<8fit^tft*5d*whttfro AVfet^ttele' a;&d
'this'sfi'fe9.' 'foi'FhRS'A'/'t'Bayt,

besides the difficulties of the subject live io liVfii^coUie p*eJu&ICM
itfii^eir
study of this book. A careful study we believe, however, will conquer those prejudices.

Before proceeding to the details of a treatise it is usual with writers to give some definition of the science which they claim to teach in their work, and we will probably be expected to do the same. Some writers have defined Logic to be the art of thinking; others call it the science and also the art of reasoning; and still others consider it to be the science of the laws of thought as thought. For ourselves we do not expect that any definition of Algebra, which can be framed will assist the student of that science very much in his studies, and therefore, a definition of that or of this science at the outset we do not consider of importance. But besides this we do not wish by a definition to put a band around the inquirer's thoughts in the beginning. If a definition convey wrong impressions, it must fetter the mind in its contemplations; and to lead a reader who has not yet studied the science, by a definition to understand the whole drift of the matter would require a full exposition of the definition, i.e. a full treatise upon the definition. We may say, however, that the present treatise is a scientific work, and that the science, whose principles are herein set forth, differs from all other sciences in the respect that it shows the only keys which can be used in unlocking the mysteries of any science. And hence, in general language, this work may be called the philosophy of science. In the title page we have denominated it the Organon of Science— not either from honor or derision of Aristotle's Organon; but because in it we propose to show the instrument or instruments by which science are constructed. Bacon called his work the "Novum Organum," and since his time several works bearing that name have appeared, all of which, so far as we know,, follow Aristotle rather than Bacon.

The word logic has so many vague meanings in the minds of men at the present day that we have used that word but little in this treatise; although our aim and the aim of most writers upon logic are, so far the same that they both propose to lay down some method by which we may be guided and kept from errors. We, however, go much further and assert that our method exhibits the mental foundations of all the sciences and the modes of their
construction; and that by the judicious application of our method, whether the thinkers were or shall be conscious of it or not, discoveries in any science always have been made, and always must be made: it made at all. For do we believe that we are endeavoring to excite vain hopes when we say that, the thorough understanding of this treatise by the scientific men of the world can not fail to open to the world a more prosperous era in science than it has had hitherto. And therefore we have the boldness to call upon scientific men and upon all men, who wish for the prosperity and advancement of the human race, to give their serious attention to it, so that intelligence may work out order and happiness in our civilization.

CHAPTER I.

• Highest Generalization and First Division.
lor other less extensive generalizations, and soon perceives vertebrata, articu-
lata, radiata and molusca. Thus the naturalist proceeds, and by classification
alone, he is able to gain a scientific knowledge of the relations existing
among animals. In like manner a proper classification of those things about
"Which the laws of mind art concerned in reasoning, is indispensable to the
clear understanding of the process employed in acquiring knowledge by reaon
Ing: without a classification as a basis, all before us will be chaos.

But how shall the metaphysician and logician classify? The object, at
which he must aim, is to obtftin the knowledge ^f the relations, or rather the
knowledge of the results of relations actually existing between the mind
itself and all other things, which can be made by the mind the subjects of its
cognitions. Now every subject of the mind's cognitions must bear some
relation to the mind itself or no result whatever could be produced. And in
order to contradistinguish thg" o JJe^ts^b^twefen ^hich the relations exist, from
which intellectual results are evolved, the mind itself may be called the ego
and all other things the ^on-ego. The word non-ego, however, in this case
is not a negative term in infng, but a positive 'riamefbfinj"kntfererything
exfsepti"ng tl^ egp, or UAind itself. The German metaphysicians distingi^-ish the
^infj ^ sejP by *'i)'ap Ich," and the French by/'Le moi"; and. Sir Wn". Hapl
fboa h,aa bro^ul,h,t the ego and non-ego into vogue in the English nom-r
.e"claja"tur". Most per"ops will know that ego. is the Latin personi^1 pronoun
corciipolidili^ tu our persopal proppn 1 of the first person; ego is More cou^-veaicBt to be used us a noun than our pronoun I, a single lettr of the alphabet^n
Qbd Lherefore it is used. And we 'consider these contradistinguishing term3t3
to be apt and useful j fur, between the ego and the non-ego, we are to look, for
the relations tmd n au|ts i a question. But yet, how shall we classify the objects
of our cognitions in a mann^Br which will evolve and clearly set before us these
liations and their r^sults. We cannot clearly set before us these relatitofys by
a classification of the various oljjectscsOadj)reliendjBd in the npn-ego, according
to some pccuViarUcs existing, inter /ae, for this does npt in a scuicently appar-
ent manner, involve the o^p: and uplese both the ego and non-ego be,ivqglved
there can be nu relations existing between theni, and no resultsjpaas be p;'odu.ced.
Vhe classili^tion necessary, as a basis of re'oning, must, doubtless,^ start with
the highest generalizationB for to plunge *in medias res,* and classify cccrtai
objects, as plaatigiakm', and others as degitgrade, only points out the com-
pjirative anatomy and relations of these objects inter se; and to classify the
faculties of the mind into memory, will, imagination, efc^, only brings out the
relations exisiinj^ between these fciculties. The mind itself, or ego, is not in-
volved in the classification; and consequently the results, springing fronji the
relations of all other things to the miad itself, with their connections on the
^e liaiid with the ego, and on the other with the non-ego, can not be appre-
Ued without finding a generalization, which shall comprehend them all.

13

ego ttiat can be mad^ aaf ti^k'o j;fei^:fwrli(^ ^ atartibg^ pWatvi^ioaid, divide
ajQi^ f;}jy9^y,,^,^,pft^l^l^ (^■Ve1V;#wv .TQi(ttkw4i pfuraded ^itfile"niUIDalist
^ Now t^eJ^)i/E(^1; gi^iwr^j^tipi^ rtha^? wrv\Ud can mak^ of both the
^Jftu"iij9"-ef9J^
you, as the point from which to run to every object of the non-ego.

* CHAPTEII II.

Facts and Truths. «

Having ia the previous chapter divided existences into two classes in such manner that the relations between them will always involve the mind, as one ("the things related, we come now to the daseification of the non-ego with reference to the ego. And a very obvious division of the non-ego, with reH'rance to the ego would be into existences of the pas^ of the present and the future. Most of us, no^^douU, have had friends whose ph}sicat forays have passed away; their forms were existendls ft the past, but in the present they do not exist; and to-morrow is but a^esent thought concern- ng the future. Bat we must observe thst, these divisions only bring out the relations between points of time. In one of which points the ego is now aituat3d ; nevertheless, as the ego and non^go are existences bearing tdi%attns each other the relations of time, these divisions, according to the points of time. occupied by each, do brmg to view l^ relations between the ego occu- pying tie present point, and those existences of the non-ego occnpying the same and different points. But all the existences compreliend'd in the non-ego may be thrown into another ^asification, which shall involve the relations existing between the^go and non-ego in other respects l^an tha( of time and of that as wel.

Th^rst sub^lasmfication) therefore, of the existences ot the non -ego, which we will make, will be into facts and truths. And in ordet t^at we may understand thifit disition, it is necessary to consider the relations of the

ego merely.as an existence among other exibilitencea. That which has had a beginning) must have been brought into existence by some anterior existence or existences. We will not stop to, argue this point now, for we do not think it will be doubted. And if ourl^^inds hare not always existed, their very beginnings of existence must be dependencies; and dependent existences come and remain as existences by the influence of that upon which they depend. And when other existences like itself with respect to 4epli!dettce, surround the ego, the ego and these other existences must be so related to each other that they may act and re act upon each other, if each be aMitted by the other: and each is either' affected by the other jdirectly or indirectly, or the one only is effected by the other, or neither the one nor the other is inelated by the circumstance of their both being existences'. Ko^ between material objects, it is declared to be a uniyersal law of nature, that action and re4U3tion are always equal and in opposite directions. Whether this law be extended to the relations between mind and mind, and between mind and matter, it is not necessary now for us to inquire. But of one thing we must te%l assured, that the external non-ego, when its existence is the . immediate subject of our cognitions, acts directly or indireCily on the ego. For a tree either acts upon and affects the mind, or to change the expression, the mind is affected by it in some manner, or the mind can have no cognittons ef the existence of a tree, and it would be to; the mind as though it were not. The mind hadabegiining and therefore it is a dependent existence; and an existence, whose coming to be an existence is dependent, must ab initio' be passiye: and its activity and pasivity both, must hare been either giren to it aimultaneously, or the former must have been developed (torn the later. For, the acting power of a dependent existence can not exist of itself independt of other things, but anotlier or other' existences are presupposed to- generate
it. And if the ego be dependent, its dependence must be upon the external 'non-Ego, otherwise it would be independent; and dependence implies the reception of action. The dependent mind, therefore, is dependent for its existence upon the action of that part of the non-ego, from which its existence came, and for its knowledge upon the action of that part of the external non-ego, ef whose existence it gains knowledge.

Now at the first with respect to knowledge, other existences act upon the mind without its inherent energy being exerted. That we are born without an idea of knowledge, will not be doubted by any well informed student since the days of Locke. The mind must exist for a certain period in its inception without consciousness: for to be conscious at all, it must be conscious of something: to be conscious of nothing is to be without consciousness: if consciousness can exist contained merely passive then a rock can be conscious. But activity is necessary to consciousness: and mental activity must be developed from the mind's passivity by the action of that part of the non-ego upon which the mind's dependence in this respect consists. For the power to receive an action must be contemporaneous with the mind's existence: but the mind must exist in the world before it Can be acted upon by any power other than that which created its being before it is real. When, therefore, the ego first comes into the relations of a part of the non-ego, from which Its existence was not derived, it must first be acted upon and act in response to the effects of the non-ego. And when the mind is unconscious of any existence, the senses, even that of touch in a greater measure at least, are secufear against external impressions, we can not doubt that the mind at first is unconscious of an external world. And the only other things which it can be conscious of are the actions of the power which created it and of its own existence. When, therefore, the ego becomes either an independent existence or a non-entity.

But we have shown the mind to be dependent, if if had a lie in the mind's, existence: but the mind must exist in the world before it Can be acted upon by any power other than that which created its being before it is real. When, therefore, the ego first comes into the relations of a part of the non-ego, from which its existence was not derived, it must first be acted upon and act in response to the effects of the non-ego. And when the mind is unconscious of any existence, the senses, even that of touch in a greater measure at least, are secured against external impressions, we can not doubt that the mind at first is unconscious of an external world. And the only other things which it can be conscious of are the actions of the power which created it and the existence of those existences which created the mind. Must still continue to be exercised, or the ego becomes either an independent existence or a non-entity.

And if the mind first be dependent, if if had a lie in the mind's, existence: but the mind must exist in the world before it Can be acted upon by any power other than that which created its being before it is real. When, therefore, the ego first comes into the relations of a part of the non-ego, from which its existence was not derived, it must first be acted upon and act in response to the effects of the non-ego. And when the mind is unconscious of any existence, the senses, even that of touch in a greater measure at least, are secured against external impressions, we can not doubt that the mind at first is unconscious of an external world. And the only other things which it can be conscious of are the actions of the power which created it and of its own existence. When, therefore, the ego becomes either an independent existence or a non-entity.

- For Hfeie's the mind act, it dan not be conscious at all: and when it dbp8,i.e.t, 'H is consWois ot Its acts, statesand feelings; but or itsel pei's^ it iXftp.icoj^-

»ci»us. Each person can test the truth of this by his own <x)nscl.yijV3ne^^ -And if the mind at first be unconscious of the action of the e;^t;ei;jj:jf^/''ld
'throng the senses, and also Hilcbfisciousness of the powers wli)ch. prpilpjo^ 
-oni* €?kxtence and wil conscioousnessess too pf its own existence jj)'^r s6, itj^t first? be without consciousness. The mind, indeed, can , be conscious' of i*a own acts ind' feelings ; but indet>endently df th'e action of other ^exji^effpes
upon it, it can not begin to act or to feel...

^K we find that a material body made up of bones muscles, etc., all of which belong to the non-ego, Oppiaina the mind. This body is related both to other existences without am to the mind within; it is a medium between the mind and existences external to itself. And the first effect produced upon the ego by or through his body gives the mind Baerely that state of activity which we call intellectifio j paaiv'lj'. The mind does not yet notice; but it possessoi more Ihai mere paanivility: it does not yet put forth*it* energy in any definite direction but it poaaesesaA energy.

*But in a little time after birth, by being continually acted upon by the external world through the senses; the mind's intensification is increase^, UX^ 't3 energies start in definite directions, and tlieii it notjceg^.

By the eye, the ear and the other senses^ H notices existences: but ihe wuehi:

the w^EN, the what, or the wti, it does not know. But in a little more time, the mind begins to discriminate and then it begins to know aQd to ha?e knowledge.

Without the power to discriminate, we could know nothing, although we might notice some things: and the possibility of discriminating lies in the relations between the non-ego and the ego. Now the only relations, which can exist with reference to the ego, between the existences along which the ego is placed, and with which the ego itself must be contemplated, are those between the ego and external non-ego directly, those between one external object and another of the non-ego indirectly through the ego, those between one external and one internal object of the non-ego through the ego, and those between one internal object and another of the non-ego. From each of these relations and from them only can we discriminate and gain knowledge. From the relations existing between the ego and the external non-ego directly, we have the action of the non-ego upon the ego, and the response of the mind itself in a directly opposite direction to the one received. This is the mere noticing of an object by the mind and it constitutes a fact. But if in the noticing of an external object of the non-ego, which is a fact, the mind also notices its own act, which, we think, is the case, here is another thing noticed, a fact different from the former, and these two facts may be compared. And let the same process be repeated with the same external object of the non-ego, and we have a relation between two acts of the mind itself, between two internal objects of the non-ego; and also a relation between each act of the mind and the external object. And hence among these relations, three comparisons may be made, viz., between each act of the mind and the external object, and between the mental acts inter se: and from either of these comparisons, the mind can gain knowledge. From the comparison between the action of an external object; of the non-ego upon the ego and the act of the mind itself in return, we gain the knowledge, if the act of the mind itself and the action of the external object are separate existences: and from the comparison between two acts of the mind itself, we can also discriminate and gain the knowledge of separate existences. For two acts of the mind in the same direction can not be simultaneous: and the interval of time, however small, forms a relation by which the mind can discriminate and separate internal existences. Separate existences hereafter we will call hetera. (Greek— heteros, a, on— others). We use the neuter plural of the Greek adjective as a noun, meaning other things — separate existences. And hence the evolution of hetera by the mind is the inception
of human knowledge. By the mere noticing of an object, the mind indeed
acts, but can know nothing, because one object per se can not be compared
and discriminated. But if the mind notices its own acts in noticing external
influences and compares them with that of the thing noticed, from the rela-
tion existing between the two, the mind can evolve the knowledge of hetera.
And we will here remark again, that the mind does not and can not notice
itself. Its acts, states and feelings, it can notice; but the knowledge of its
own existence, as a potential mind per se, is gained only by comparison.

Now things merely noticed by the mind we call facts: the knowledge
gained by the comparison of noticed existences, we call truth: and this is
our first classification of the existences of the non-ego. Facts then, are

- 'each of these classes of facts may again be divided into five sub-
classes. Perceptional facts are naturally subdivided into the five classes,
viz. visual and auricular facts, facts of touch, of taste and of scent. And
hence one external aggregate existence—by aggregate existence we
mean an existence to which we can apply our organs of touch, of taste, of
smelly or sight and hearing—may contain five perceptional facts or external
noUceables. Such an existence as red, or an existence to which
we can apply but one specific organ of sense, we call a simple existence and
not an aggregate one. But two aggregate existences, then, will contain
ten perceptional facts. And if each fact of the same aggregate existence,
18 compared with the others, there will be ten comparisons of facts inter se
of the aggregate existence. And if we compare each fact in an aggre-
gate exist^u^ with each fact in another aggregate existence, we will have
twenty-five comparisons. And hence two aggregate existences contain ten
facts and afford forty-five comparisons, from all of which truths can be gained.

CHAPTER II.

CONSCIOUS TRUTHS.

In the preceding chapter we explained what we mean by facts and
endeavored to show to what existences we apply that term. We showed that
those existences which we call facts, in and by themselves separately con-
sidered, make no part of our knowledge; but that they are the foundations
and pre-existent substrata upon which our knowledge stands and from which it springs. All knowledge lies in relations and the mind evolves from comparisons. Were a person so brought into life that he could see the sun, i.e., notice this perceptual fact, but notice nothing else, i.e., have no self-conscious fact, he could not know that the sun exists. We cannot say that the sun exists without having the knowledge of existence. For, the phrase “The sun exists,” or “The sun is,” is equivalent to “is, viz.: ‘the sun is an existence. And unless we first have the knowledge of existence, we cannot know the sun to be one: not a single fact but facts must come to the mind before knowledge begins. And when the mind first notices a perceptual fact, there is also always lodged in it a self-conscious one: these facts, the one perceptual and the other self-conscious always enter (the mind in a binary manner. For, as we have already said, the ego unconscious of itself per se, takes its place among other existences to be acted upon and to act in return. And these perceptual and self-conscious facts keep coming in a binary manner repeatedly before the mind compares them at all: but when it does make the comparison, the knowledge of separate existence is evolved. This knowledge we call conscious truth. And hence we say that we are conscious of an existence though the knowledge of an existence be not a fact to us, but a truth evolved from the relation of facts: the fact of an existence per se is noticed but not known by us.

The relation of perceptual and self-conscious facts is necessary to the beginning of consciousness. For, as already said, to be conscious implies to be conscious of something, and to be conscious of nothing is to be without consciousness; and the human mind had a beginning of existence and it is a dependent being. And although, indeed, we can not tell by the proofs which nature offers, but that the materia mentis, so to speak, may have always existed, and that at the first it may have been inclosed within a human body and afterwards handed down from generation to generation; yet that there was a time when our consciousness did not exist, is clear. For, the materia mentis, let it be what it may, could not, per se, by its own inherent power separated and independent of all things else in the universe, be conscious of anything except itself per se. And although the mind be conscious of its acts, states and feelings, yet that it is not conscious of itself, i.e., not conscious of the FACT of a materia mentis, our own consciousness teaches us. And if the mind be not conscious of the fact of its existence, or to use a phraseology more tangible to some minds, if the mind can not itself, it must be a dependent being, and its dependence must be a dependence in every respect at least except existence alone. And that the materia mentis in such relations as entitle it to be called a human mind had a beginning can not be denied: and hence its consciousness in these relations must have had a beginning: also. And as the human mind is inclosed within a body, were

this body impervious to the action of all external things, the mind must be conscious of itself. And although it is often said that consciousness is the very thing that distinguishes animate life: yet the lack of actual consciousness does not establish the lack of potential consciousness or the nothingness of mind. ; Consciousness is not the mind itself: the materia mentis must first exist before the conscious being can. And if, as we have shown, the mind in relation to . be conscious, must be conscious of something, this something of which it is conscious, must be brought to this mind itself by the external non-ego: observe how the humah mind could rear a structure of knowledge from out of itself and independently of all things else in the universe. Consciousness, therefore, as it can not exist without a mind to contain it, so like-
wise if oao^ oot exist in (he human mind independent of all things except the
mind'.: without the non-ego the ego could- not be conscious.

Now there is in man lei meteria mentis, or an immaterial substance, or
it .you please and as some suppose an arrangement of physical organs in some
manner so that the arrangement affords the conditions necessary to become ' 'coDtxcotis when acted upon: we start no question respecting either of those
or. of wly theories. What may be'the essence of mind, we do not know, but
whatefW it may be; we find it, in a proper organization, to be capable of
knowledge ; and our inquiry here is with reference to this knowledge. And
the first knowledge, which the inglfd gains, is cDkscious tkxjth. And if
c0BB^ousnesB depend upon the relations of facts, i. e., upon existences ^hich
•are inter se hetera, it; ndust spring fn)jL those Teiations. We may say, that
tbe^iK^n has- knowledge of something^ This sentence contains the mention
of thoe existences viz. : mind, knowledge and thirig. We may say that the
mind is eoiieGioue ot soznethin^; and this sentence contains mind, concious-
neas and thing. And if^ as we have shown, the mina notices its acts,'but not
its' ; msd conscioasness be depi^ndent for its existence, then, if the later sen •
tenoe lie trttei:cofiseldueness must have been evolved from the relation of the
action ot theaif)[KD, and that of the thing. An object of the non^go afiects
the materia menttSy the mind acts; and from the relation of -the effect pi^o-
dttced upoo tkwe -mil'eria mentis, and the returned action of the mind, spring
conseleasnoNi or the knowledge of existence-. Consciousness is the result of
reixti^na and it is envolved from facts. When we say that we know that
stove IB not an act of our mtiijtds, becaiise we are bonscious of this, we state
wIMit is not true. W^ b^onite coni^ious of the 'exfsteence of an act of mind
and of a stove, and- the judgment then discriminates between the two by
comparison. Couseiusness is merely the knowledge of exlA'tence ; and the
thing. or existence 6f which we are conselov^s, i^'e call a conscious truth.

Now we have shown that tliere are perceptional and self-consclenal
facts; there i^wi'll be evolv^ed therefore, from the relations of these two classes,
^nacions truths grounded in the non-ego and also conscious truths grounded

in the ego. And as numerous as the perceptional and self-consclenal facta
may be, so numerous will be the conscious truths. For every relation be-
tween perceptional and self-consclenal facts evolyes twoconsoiONAL truths.
The relation between the perceptional fact of a tree and the self-consclenal
fact of the mind's act in noticing that tree evolves two conscious truths, the
one being external and the other Internal. From the relations of 8e)ih)oa-
scional facts inter se, howev^, or from the relation of perceptional fi^s
inter se, conscious truths can not spring. From the relations of perceptional
and self-consclenal facts, spring conscious truths, and then these conscious
truths can. be compared promiscuously. Conscious truths, therejEbre, like
perceptional and self-consclenal facts, upon which they immediately depend,
come to the mind in a binary manner.

Kow by each of the five senses, the mind notices perceptional fVicts:
when these facts by their relation to self-consclenal ones, rise into conscious-
ness, tiily become conscious truths which are grounded in the non-ego. So
likewise when self-consclenal facts from their relation to perceptional ones
rise into consciousness, they become conscious truths, which are grounded in
the ego. There are, then, two great classes of conscious truths, viz: con-
scious truths grounded in the non-ego, and conscious truths grounded in the
ego. But that the one class is grounded in tile ego and the other in the non-
ego, is not determined by consciousness, i. e., we are not coilBcious of tliat,
but this knowledge arises from an act of judgment in compfuring two con-
scious* truths, i. e., two existences of which which we have become conscious.
Now it is said by some philosophers, that the mid does not occupy
space, i. e., that space is not necessary, not one of the conditions pf its
existence. But nothing certainly can be more absurd: for that, which does
not exist anywhere, can have co existence. Because we can not tell the
precis where, in which it does exist, does not prove that it has act awHSRE
in which to exist. Ths", which has an existence kowhers, has no existence
at all: and every where is a where in space. The ego exists somewhere
and in this where lie the conscious truths grounded in the ego: the non-
ego exists somewhere and in this where lie the conscious truths grounded in
the non-ego: the wheores of the ego and of the external non-ego are hetera
of space. Now we must recollect that the conscious truths grounded in the
ego and those grounded in the non-ego come into existence simultaneously;
the only things which, the mind can discriminate, between the conscious truths
grounded in the ego and conscious truths grounded in the non-
ego, merely as existences, are the wheelers occupied by each, i. e., the wheores
can be discriminated into hetera. We classify, therefore, all conscious truths
into conscious truths grounded in the ego, and conscious truths are classed
in the non-ego: and that these two classes of truths respectively are thus
fground'ed, the mind determines by heterating their wheores. Each of these

CHAPTER IV.

. . NOMINAL AND TBPOSITIONAL TRUTHS.

In the last chapter we endeavored to show what we mean by conscious
truths. We do not mean m^c conscious truths, truths which possess con-
sciousness, but existences of whose excellence we become conscious. And we
showed thilt we gain the knowledge of conscious truth by being able to
separate the external and internal existences of the non-ego into hetera.
This is the first step in the acquisition of knowledge. And were we not
able to do this, all would be chaos; but this once done, chaos breaks and
ordei* takes a beginning: and then we proceed further and discriminate in-
ternal existences inter se, and also external existences inter se into hetera.
But, as yet, we know heterical existences, we have the knowledge of existence
merely as existence; and merely as existence, existences are all alike. A
sound, a taste, a color, etc., merely as existences are hetera but alike: they
are, as existences, heterical similia (Neuter plural of Latin ; similis, e — things
resembling each other).

. But sound, taste, scent, color and touch, being existences grounded in
the external non-ego, may be further discriminated by the different modes or
manners by which they are related to the ego. And hearing, seeming, smell-
ing, tasting and feeling being existences grounded in the ego, may also be
discriminated inter se by the modes or manner by which they are related to
the external non-ego. The manner of receiving visual impressions and see-
ing is different from that of receiving articual impressions and hearing. And
this difference of mode or manner, whether there be any other differ-
ence or not, distinguishes the five classes of conscious existences grounded
the non-ego inter se, and also the five classes of conscious existences grounded
in the ego inte* se. The"modes or manners by which the mind is brought
into relations with the external non-ego, belong to our physical organiza-
tions, and inter se they are differensia (Neuter plural oayliizeG^m differensia, ens
— things differing.
^ By DIFFERENTIA WC do uot mcan difierence,mt things differing, hetera J

Unlike in area between a parallelogram and triangle of the same base and
altitude ia one-half 4he area of the parallelogram : but the difference between
red and green can not be pointed out. The difference lies in the causes of
these effects upon the mind ; but what those causes are, we do not under-
stand sufficiently, so that we can contemplate them otherwise than by the
effects themselves, which we can only discriminate into things differing —
differentia. If we resolve a ray of light into its elements by the prismatic
spectrum, and- then from different combinations of elements, each combina-
tion having on3 element at least in it the same as in the others, we find
difte rent colors to result, the difference between these combinations, is the
additional element or elements in the one more than in another: but the
differeit between the effects per se of these combinations^ upon the mind,
we can not point out. That these effects per so are differentia, hetera unlike,
we know ; but that is all we know about them per se.

Now had it been possible for man to have become conscious of only
-Bne existence, he never would have invented' a name for that existence. For
everything which has a name, has receieved that name to distinguish the re-
sult of a heteration of a differentiation or of a comparison of tilings. Suppose,
for instance, that every object of vision had possessed but one color: no dis-
tinguishing name then for any color to distinguish it from others, could have
"been introduced into language. For the word "color," w^ould have expressed
all the knowledge that man could have had in tfiat regard. And although
this existence (color) would have arisen into consciousness: yet the only
necessity in a name for it, would have been to distinguish it from conscious
truths of the other senses. And linlecss men became conscious of the very
essence of existence they could by making some possible discrimination
gives names only to distinguish existences inter se. And supposing now, all
the senses excepting sight to be wanting, and all objects to vision to possess
but one color, then there would be no other existences grounded in the non-
ego to discriminate inter se, and the words seeing and color \would have
been sufficient to discriminate the parts of man's knowledge. But suppose
now that along with the one color, one existence of sound should rise into
(jonsciousne^ss, here now is an existence of a different mode, possessing Ja
different relation toward the ogo from color. There is, indeed, no assignable
difference within our knowledge between a color and a sound per se, the)" are
simply differentia, hetera unlike; and their modes ot relation to the ego are
differentia: but the difference between hearing and seeing per se cannot be
pointed out. The differential modes of relation, give us 4he knowledge of
llie differentia, sound and color. And now, upon the above supposition, wo
know one sound and one color, and know these two existences to be differ-
entia: and to distinguish!>h these two existences inter se liy words, two namr^
are necessary. A name for the one existence alone, will not answer to enable us to mention the other. If we should call the one color, not color might stand, for the sound. But suppose now ascent also into conscious 'ness: we have now three differentia: and if we wish to speak of them, we must have three distinguishing terms, one for each: and so on through the senses. - '

And hence we see that there will be five generic names in every language, which has attained to any perfection, to distinguish the five differentia of conscious truths grounded in the non-ego. These names are signs of the results of the mind's discriminations by modes of relation among conscious truths grounded in the non-ego. A* ll^e discrimination is also made with like results among conscious truths grounded in the ego. But in giving these names, men are not naming facts, nor are they naming conscious truths perse; but they are giving names to distinguish conscious truths inter se. Facts grounded in the non-ego per se, have no names to distinguish the differentia inter se: conscious truths per se have but one common name, to-wit, existence; but conscious truths, which are inter se differentia, have five names for those grounded in tlic non^ego, and five names for those grounded in the ego: each of the differentia is in language distinguished from the others by a name. These truths spoken of, which are inter se differentia, and grounded in the ego and in the non-ego, we will call nominal truths: because they are the first truths distinguished by differential names. The nominal truths, then, are sound, taste, color, touch, scent and the^ hearing, seeing, feeling smelling and tasting: all these are in^er se differentia. We do not mean, however, that these truths were historically the first truths named. The progenitors of our race would be likely to give names to aggregate existences first, as they would come in contact and feel deeply interested in them from the beginning. But philosophically, when attempting to reduce our knowledge to scientific order, nominal truths come up next after conscious truths and they are the first truths distinguished by differential names.

Now proceeding with our inquiry, as we have called differential conscious truths, nominal truths; so the truths gained by differentiating nominal truths inter se, we will call primary propositional truths: because they are the first ones that can be exhibited in propositions in which the words 'jjo\ NONE and not do not occur, and in which the subject and predicate are not represented by the same name, as red is a color. And for the present, we will dismiss from our consideration, these truths grounded in the ego, and consider those only, which are grounded in the non-ego. Suppose all the exUtences ol visiogi presented to our eyes for twenty years of our life, to have had but one color, green for instance: and supposing all of the senses to exist in a healthy state, at the end of that period, we would have the nominal truth of color, and some name to distinguish it from the nominal truths of the other senses: suppose this name to be ochlor. And suppose that another existence, red for instance, sh^uhl then become a conscious truth. , Now if we slM\uld compare this new existence with allthe. othereof which we had any knowledge, excepting green— the first color, we would perceive that it was not on the same scale of truths, like «ny of them' in any respect. As a conscious truth it is like them all ; for'all of them are conscious truths. But as a nominal truth, a Airther consideration- and discrimination^ this new
existence has nothing in common with any of them. But if we compare
this idea with that Greek, we perceive that they both agree in their modes
of relation to the ego; and it was because the modes of relation to the ego
are differentia that the conscious truths of sound, taste, scent, etc. could be
discriminated into differentia — into nominal truths. But in the case of red
and green, the modes of relation to the ego are not differentia, but similia,
and hence red and green, as conscious truths, can not be discriminated at all
into differential nominal truths; but we must proceed further and discrimi-
nate inter se nominal truths (to which both red and green belong, and there-
fore the word color is applicable to both), into primary propositional truths.
Red is discriminated from the conscious truths of the other senses, in the
sarine manner that green is, and the name color may be applied to both and it
sufficiently distinguishes them from the other nominal truths; but it does
not distinguish red and green inter se. And to do this we must necessarily
discriminate colors. This we are able to do. And the reason that we are
able to discriminate colors, lies not in their modes of relation to the ego, but
in cause, which are differentia working through modes, which are similia:
the modes of relation to the ego are Similia, but the relations themselves are
differentia: and to distinguish these relations inter se two names must be used.
Red and green, therefore, as nominal truths, are both distinguished in
language by the name color; as primary propositional truths, the one is dis-
tinguished by the name red and the other by green. And hence we can
say that this color, this nominal truth distinguished by its mode, is among
truths of the same mode, distinguished by the name red; t’is color is red.
And if we add another color to our list, we must deal with it in like manner,
and differentiate it with the nominal truths of color, and then differentiate thes^
situated nominal truths into primary propositional truths and so on; through
the t50l6PB. And if we now call color a genus, as is generally done by
logicians, we will then have species of color. And thus we nay deal with
scents, sights, tastes and feelings.

And hence we see that primary propositional truths arise by comparing,
and generically simulating and specifically differentiating nominal truths.
Attd’these primary propositional truths, which as primary propositional
truths agree in every respect, will of course, be classed together, i.e., will
have a common name for each and every one of the individuals thus alike;

2<x-
Just as all nominal truths inter se similia, will, as nominal truths, have a
common name. Take the primary propositional truth red, and suppose two
heterical 1110)8 ta be before us; now ’two heterical reds as primary proposi-
tional truths, are exactly alike in every respect, starting from the pacts,
—which lie at the foundations of them. They are both perceptual pacts:
both are conscious truths grounded in the non-ego, both are nominal truths,
and both are primary propositional truths: but we can carry our discrimina-
tion no further. As primary propositional truths, they are alike in every
respect in every step from pacts: and could we not at the second step, exist-
ences grounded in the non-ego, discriminate them into hetera, they would
be to us the same thing; ’And in this manner are sounds, colors, tastes, scents
and touches divided and classified.

The nominal truths of sound are divided into musical and non-musical.
And the primary propositional truths of musical sound are again divided
into rhythmic, melodies and dynamics: these last are secondary propositional
truths. Non-musical sounds too are frequently subclassified ’ by calling to
our mind afid connecting with them some object which is supposed to pro-
duce them, or some state or feeling of the mind itself, which certain objects
produce; as vocal, nasal, pleasant, dismal, deathly sounds, and soon. But there are, no doubt, thousands of truths perceived by the mind without names to distinguish them. For the colors, which are differentia, and the sounds which are differentia and so on, are very numerous, and only the very appi’e-clabk and marked differentia receive distinguishing names. Now conscious truths, nominal truths, primary and secondary propositional truths, exhaust our knowledge of those simple existences, which we will have occasion hereafter to call facial gregaria.

. . CHAPTER V.

OBDINAIi, CARDINAL AND TEMPORAL TRUTHS, AND TIME AND SPACE.

Having in the last chapter treated of those existences, which we will have occasion to use again in our inquiries under the name of facial gregaria, we must now proceed to classify still other truths, which enter into our daily concerns of life, and from which we continually reason. We have already shown hetera to lie at the very foundation of our knowledge. And although the UNIT is the first of the series of cardinal numbers and the base of the system, yet duality or plurality is necessary to our knowledge of the unit. Without the knowledge of two existences at least, we could not have the knowledge of the unit. For, the knowledge of one springs from numerical relations; and with one existence per se there can be no numerical relations. Now we have already seen that, differentia receive distinguishing names. But hetera also receive names to distinguish them inter se. If we compare one conscious truth with another, and cannot discriminate them into nominal truths, i.e., into differentia, the only way that is left for us to distinguish them at all by mimes, is to mark them first, second, third, etc., and this result is accomplished by distinguishing existences merely into hetera and marking the individuals. These truths, therefore, we call ordinal truths. They come to our minds in point of time at an early period of our knowledge; but they may not receive names to set them out clearly for a long time afterwards. Ordinal truths are simply the relations of separate existences as existences and their names distinguish the individuals inter se. And hence these names may be applied to anything, just as we may call anything of which we have knowledge, an existence. And in point of time the ordinal truths or numbers, philosophically considered, must come to our minds before the cardinal truths or numbers. And historically, this appears to have been the case. We find the ancient Jews, Greeks and Romans, using for their notation the first ten letters of the alphabet, which upon reflection will be seen to express much better the ordinal than the cardinal numbers, and for which purpose they were most probably used at the first, and for which they are now with us exclusively used.

And after the ordinal numbers or truths are obtained, we have but to compound or colligate them and name the colligations (for in nature they will be similia hetera unlike) and we will then have the cardidhal truths or numbers. Cardinal truths, therefore, are colligations of hetera with a difference inter se of one, and they are distinguished in language by the names one, two, three, etc. And as each colligation is a colligation merely of hetera, the distinguishing name given to any colligation may be given to a like colligation of things differing in nature from the first, as two men, two horses, etc. The abstract nature and applicability of numbers to any and everything, is owing to the circumstance, that they are names of hetera,
which do not take into consideration, in any manner, differentia in nature, but which merely represent heterical existences. When, however, we apply these numerical names to objects in the concrete, the objects must be heterical similia. We can say that a potato and a horse are two existences, but we cannot place after the word two any differential name by which we can express, in the concrete, the numerical sum of a horse and a potato.

But again: we have already seen that facts, the one perceptual and the other self-conscious, enter the mind in a binary manner, and from their relations, acts of the mind itself become conscious truths, known existences. And conscious truths grounded in the ego may be compared inter se, and from

their relations another class of truths may be evolved. If two acts of the mind in the same mode and direction, be discriminated, we will have the temporal truths of once, twice, thrice, etc. Whether a man can hear, see, smell, etc., all at the same time, which is probable, we will not discuss. But that a man can not see or hear, i.e., that the misilii^f^Snii^PiJgfS the same

mode and direction in either hearing or seeing twice at one and the same time is evident. Place an object before you and look at it, and then after having taken your eyes away from it, look at it again, and you will not say that you have looked at it twice at one and the same time. The comparison, therefore, of two conscious truths later se similia, grounded in the ego evolves the temporal truths of once, twice etc.

But again: if we resolve existences grounded in the juoh-ego into hetera, we will, of course, perceive a plurality of existences. And if the modes of relation to the ego, of two existences so resolved, at the same time, be the same, we must perceive that the two existences do not occupy the same wheres for if they did we could not, at the same time, resolve them into hetera. Red, for instance, which occupies but one point, can not at the same time be resolved into hetera, into separate existences, into two beds. Heterical existences grounded in the non-ego, which are related to the ego in like modes, necessarily occupy heterical wheres. Each of these wheres may be but a single point, which can not be resolved into hetera; but the two wheres must be separate, and if they be separate, that which separates them we call space. Space is a truth which forms a class of truths by itself alone. Wheres are necessarily resolved into hetera, when we resolve existences grounded in the non-ego into hetera, i.e., existences grounded in the non-ego can not be so resolved without heterical wheres. When we resolve existences on the other hand, which are grounded in the ego and produced by the ego's action in the same mode and direction, into hetera, we necessarily resolve times into hetera. Time also is a truth, which forms a dass of truths by itself. Mr. Hume derive our knowledge of space from color. And if a color cover sufficient space to be resolved into two or more soMmWHERBS, space will be evolved from the relation of those wheres: but if only a single point of color, so minute as to be incapable of being so resolved, be presented, no knowledge of space can be gained from such a point per se. Mr. Locke obtains all our knowledge of space from both touch and color, and this may also be done in the manner we have stated. Sir Wm. Hamilton calls space "A native idea of the mind," which expression seems to have no meaning.

We have now shown how we derive and classify our knowledge of colors, tastes, scents, touches and sounds, and of acts of the mind itself into hetera, of ordinal, cardinal and temporal numbers, and of time and space. And it will be seen that existence, not as a class distinguished from other
THINGS, but as the state of being in contradistinction to non-entity, stands al\# the head of our inquiries. Existences are then divided into perceptional and self-conscional facts, and from the relations of these we evolved conscious truth?; our first class of truth?. We then found some conscious truths to be grounded in the ego and others in the non-ego, and in each of these classes

we found nominal truths, so called because they are the first truths which receive differential names. From the relations of nominal truths inter se, we then evolved primary propositional truths, so called because they are the first truths which can be used in propositions in which the words no, none and NOT, do not occur, and in which the subject and predicate terms are not the same name. We then evolved secondary propositional truths, and saw that we had exhausted those simple existences which hereafter we will call facial gregaria. We then evolved the ordinal, cardinal and temporal numbers and time and space. And we must still proceed further with our inquiries before we commence where logicians have usually commenced in treating of the reasoning processes. But if the reader will have patience to follow us in our preliminary inquiries, we believe, he will be able when we come to treat of propositions and the syllogism, to understand the whole matter and to escape from the obscurities and perplexities, which in our opinion, have hitherto surrounded those subjects.

CHAPTER VI.

CLASSIFICATION OF AGGREGATE EXISTENCES AND OTHER TRUTHS.

Having already considered those simple existences grounded in the non-ego, which we shall call facial gregaria, we come now to the contemplation of Aggregate existences. We may find a color, a sound, a taste, a touch and adjacent, all situated in one location. Two existences grounded in the non-ego and related to the ego by the same mode, can not occupy the same where at one and the same time: for if they do, the existences can not be better. Thus: two colors can not exist in the same where, nor two sounds, nor tastes, etc, at the same time. But the five nominal truths grounded in the non-ego, nevertheless, may all be found co-existing in the same where and forming the facial gregaria of an aggregate existence (Gregarius, a, um; gregaria, neuter plural — things in a herd). And by an aggregate existence we mean an existence composed and made up of simple existences; as the leaf of a rose, iron, snow, a stone, water, etc. These aggregate existences grounded in the non-ego possess facial gregaria, some, if not all of the nominal truths grounded in the non-ego.

But aggregate existences, besides the facial gregaria, have also capacity gregaria,—i.e., capacities to receive and give effects among themselves. If we move two heterical and aggregate existences towards each other, we find that both can not be made to occupy the same where in space at the same time; one of them must necessarily exclude from its where, the other, or they could not remain hetera. This capacity gregariupi of aggregate existences is called impenetrability, and is said to be one of the primary properties of matter. And each particle of matter must necessarily have a where in space and without a where it must cease to be an existence. Impenetrability —
matter did not possess impenetrability each particle might annihilate its
neighbor until the earth became a non-entity. And another essential capa-
cial gregarium of aggregate existences is form or figure.

But after we have gained a knowledge of matter, i.e., of aggregate
existences, we readily perceive that in some matter the particles cohere
rigidly, while in others they move freely among themselves. This capacial
gregarium of the one and that of the other are inter se differentia: and if we
distinguish these gregaria inter se we will have the classes, solids and fluids.
Then again fluids may be discriminated by their facial and capacial greg-
garia: one will not have a like color with another, and their tastes may be
differentia: a volume of one may be tried in a balance with an equal volume
of another, and their specific gravities be found to differ: heat may be applied,
and fluids be found to differ in the degrees of heat necessary, ceteris paribus,
to make them boil, etc. And wherever the mind can discriminate into differ-
entia, it will form classes of fluids; and those which are not to us differentia,
may be called by one and the same name. The knowledge of all classes of
fluids is gained by differentiating their gregaria either facial or capacial:
capa-
cial as well as facial gregaria being truths grounded in the non-ego.

And when men begin to examine matter closely, they find that the
particles composing one bulk may be analyzed, i.e., discriminated into differ-
entia. And hence they form classes of what they call elementary substances,
i.e., aggregate existences, the particles of "which can be discriminated into"
"hetera, but not into differentia. The ancients knew but four elements, vis-
earth, air, fire and water: man has since found a great many more elementary
differentia. And every differentiation, that the mind can make, throws new
light upon the world which adds new truths to our store of knowledge of the
elements. Now the number of facial gregaria that matter may possess, so far
as we can know, when expressed in the classes of nominal truths, is five.
Each of these five classes, however, are divided into numerous primary pro-
positional truths, which have names, and besides these there are various
other classes of which we have knowledge but for which we have no names.
But the number of capacial gregaria of matter is found out slowly, one
after another: and where the number ends we can not even guess. Each
generation to come may find out new capacities of matter, and when they do,
they will of course make new classifications according to the differentia dis-
covered. We have matter, now, classified by its specific gravity, its attraction
of cohesion, its friability, its ductility, its maleability, its compressibility, its
effects received and produced among existences, etc. Any capacial gregaria,
which are inter se differentia, may produce classes of matter. Chemistry is
a succession of differentiations of elements and compounds, i.e., capacial
gregaria discovered by experiment. And what is very strange, the mineral

enter into compounds in a binary manner, as truths are compounded, So to
speak, in a proposition as we shall see by and by. Thus: carbon and oxygen
unite and form carbonic acid; hydrogen and nitrogen unite and form
ammonia: and then the carbonic acid and ammonia unite and form the carbonate
of ammonia. Now the menial process of simulating and differentiating hetera,
gives us all the classes, which we possess, of the different kinds of com-
ounds and elements. The classification of matter by differentiating its
capacial gregaria, so far as it has been accomplished, may be found in works
on chemistry and materia medica. And we must perceive that aggregate
existences when stript of their facial and capacial gregaria, are unknown to
us. The gregaria are the only things of which we have any knowledge
through the senses. That which lies behind the gregaria are merely infer-
ences drawn from the gregaria.

Kow after knowledge has increased and language been inrented to ex-
press it, the science of grammar takes its rise. Men begin to similate and
and differentiate words. The parts of speech are classified by differentiating
the intentions of the mind in using different words, i. e., by the functions of
words. The principles of the declentions of nouns and adjectives, and of the
conjugations and inflections of verbs are obtained in the same manner. The
knowledge of^nse i€( gained by the discpimination of , times into hetcra: of
modes by the differentiation of manners and so on<

The same mental process also obtains in Betany. The botanist differ-
entiates, cotyledons, radicles, plumules, etc., and as the plants grow he finds
buds, which he in like manner classifies into auxiliary, accessory, adventi-
tious, latent and so on, he also differentiates the leaves and give distinguish^
mg names to each class. The whole classification of botany, shows, that the
human mind !ias been dealing with every part of the plant by similating and
differentiating. • •.

And if we look into Zoology, the same mental process meets us at the
• threshold. Vertebrated, radiata, articulata, rumenants^ pachydermeta, planti-
grade, etc., are classes obtained by the differentiation of truths. And this can
“easily be shown to be the case with ethnology, entomology, mineralogy,
apany and all of the natural sciences. And. hence, each of those sciences
is also a mental philosophy giving us the classifications o*f as many truths
as the particular natural science contemplates. Accepting therefore the
classifications of the several natural sciences and making them our own, we
will proceed to consider other truths, which come to our knowledge from
other sources.

^ After having obtained the knowledge of space and matter, we maj'

easily get the truth of extension. Extension, indeed, independent of every-
thing else| has no existence : it is not a consious truth. We speak of the
extension of jspace and that of matter : but had there existed nothing extended •

extension could have made no part of our knowledge. And whatever is ex=r
tended must be so extended that two points in space, two somewheres, caa
be discriminated by the mind. And hence extension when applied to matter
means consecutive and contiguous ppoints, which can be discriminated. And
in every other sense, the word* is misapplied ; and* it is thus when we use ex-
tension as synonymos with space. The proper meaning of the term exten-
sion is the stretching out of something. And if we take twp points and con-
sider the space between them, and then remove one of the points further from
the other, the space between them will be extended'. So if we consider a
colored point on paper, the enlargement of that point will extent the area ol
the color. A mere mathematical point can not give us the knowledge of ex-
tension: but two mathematical points separated from each other, can give us
the knowledge of the extension of space. Our knowledge of extension is'
gained by the discrimiation of heterical points located in something in
space, or in space itself. The consecutive points must all be in some exist-
ence of the non-ego: for extension is a truth gained, by the comparison of
truths grounded in the nour-ego. Extension, like time, and space, forms of
itself but one truth and a class of truths, i. e., there may be heterical exten-
sions but the hetera are inter se similia; there 'may be heterical times and
heterical wheres, but inter se times are similia, \^\^ and so of whwes, and there-
more, each makes but one class.

But again, if we take an aggregate existence, -a piece of iron for
instance, and move it to another place, we will perceive that it is not now in
the same whbbe in which it was before it was moved, it has changed its
place in opac\^\^\^\^. And hence the "etbbatiOn of wheres occupied at differ-
enific times by one and the same existence, gives us the knowledge of that
existence's motion. While the same points in an existence remain in the
same wheres, no disorimination of any points wheres, of course, can be
made, and without the aETERATiON of one and the same point\'s wheres, no
motion, of that point can take place. This truth of motion; again; foiins of*
itsel itself a cla\$s of truths.

But again: we hare in our minds testimonial truths. And testimonial
truths are tbo66, which we .receive upol the testimony of ^others without
bringing them up from facts for ourselves. And every witness must testify
in that only which has come under his own observation, or to a truth vphich
his own mind has wrought out: or, if a person state that which has been
told to him by another, and the other but related what he had heard, in
order that there may be any truth at all in the story, there miast have been
Aoine person, whose mind brought the truth in question up from facts. For
some truths, we are entirely dependent upon the testimony of others: as that ' 'Cesear was assassinated, Columbus discovered America, etc., while there are
others, which we may gain for ourselves from nature and also, receive them

a aqlidi.or f1^14^e would liave had nothing at whldi to liugh: ibiFfie eottld
haTek|ipV\n nbtiliing about the subject Of the conv\'ersaiohJH\^ a tr\^er
slM]>ujid di\'yerin some must unexplbi\'ed\'co\' an ahlmal\'th feet like ihose ' of Wcow\'abpifji\'likeiiWef alizzaM, kna a head like tirt -of -k crane, by
uaii^ these\" things with whibii we are familiar to explain th^ apyeatatflee^ of
ihcI Yl\'loj^i\'part\^ of this newly diiseoyetfed cteHttur\^, he could giVe ds a con-
ccl\^\^n o^ hfs atninal as a whole. But should a traveler disqpref tm alliaial,
whc in i^ whole olji^ In tig parts, Wits enttfelytknlfice any thiiig<^ff=\hieh\'>
-vra baye any knowleufe, he could not possibly, 4>y language, ghre uSany eon^
cepioa of whiit\'he had seen. And in order that we might -gain any kHowl-
ed\ot puhp an jmimal, we would haTCTo seeethe anlliaMts*lfl, oi^ have a
picture or sculptured image bf It presintifed to us. ' ". -

Bnta\'alin: wehave thekhowled|fed\t' existences of the imagination.
Thes\^ existji\'nces are peculiar and require some cfdisslderatkjnhhei\^\^. Centatirs,
Sf\%'i1f5,f1(TOfes, Hydras, etc.\^\^, are repi\'csehtcd td,tis\^\'while lihes^ ereatut\'a'
reii\'y have had 90 objeetive existences ill natute. Yet thtf inind ^iller se hai^ no »
pow\'r to create from nothing existences of any kind i even th^\'b\'-less \fWbrio
of drealAs is not tlie creation of the Wind from nothing. ' "Biit ^if ' existei'' >
of the iinnagim|tibn have no real objective existdnce, and If the mind ci^< hot
create t|^^ Thpp nothing, ;wehhe do* they come t^ be subjective ^istences?'
The sfaii^ of th<^ ^ase is this, a eentaur,'and all 6theVextst`ces of thrhk^gi
ni^ion,n, th\QJilgh they have no real objective existenbe ih liature a^cbfffibina^
tipn and whoKe, yet all of them, partially in th'S \arts cfsconsidered, havea real
ob"ectjtb efistence'. A centaur is an existence of ; the iniginitf on, tfte parr
9f whic^ "Vi'l that pf a iilian, and the other like that of al hdrose. Both' of
thft pwts jsSepwat^ cbiiisidere^^^ a real objective existehee in nature.'
The |nMyi|nat|Qon unites these parts ' and frbni theit' comblnatibn create an
fx^ten^,'which has a real subjective existj^n'ce, but v^hidi'as a w^e, a
unity, has no objective existence. Biit had the;partilr, sejtoately' tonsMered,
110 o^ective existenee, their unity could never haVe* had yjstilijective exist** ' enee. All the. ima,qinW. monsters of ancient and'' ^^'^ tii^erhave b^n
fwrwkcd in this manner.' *rhe' images in %orkg of flct1bn, the Qods bf Honi^i
th? Metamo^Rkfex of Ovid, and tUe cliavacler of flamlet ^^nd :6^el&'it^ ■
creftturefl of i^^gi nation, wJiicU have been collected in Oie sa'niejnanrier. *' 

' • CHAPTER Vir.

CAUSE AND EFFECT. . * ' - -

As we will havelDccasion, in a subsequent part of this volume to treat
manner of cause and effect, it seems necessary to prepare the way by examining' tin?
manner in wfeich we come by the knowledge of these existences. Now v^t
can gain no knowledge ©f cause except through effect. We may know
ai^nici a metal ; but as a poison a cause of death ^o animals, we can
know nothing of it, without first having the knowledge of the effect; that
this capa^^l gregiarim is <Jontained in it, is found out throu^' the effect.'*
We can not yi«w objects, which are potiential .causes, and per se. determine 'suoh to l^ their case, a priori ; it is some effect of which w^ flMd gain tfee' '
knowledge, that brings to our minds the. knowledge of cause. But the
veigr.iiijstai?! we lopk upon anything as an effect, we have the knowledge ^f
cause: for, cause''and effect are but counterparts of each other. To under^ stand, therefore, what we meaji by cause, it is 'cessa# to bejgin With the
examination of effect* - .* . . '

Now an effed, in general language, is some change prdudecl.* Without
change there can be no effect. If we conceive of the earth as having
always existed, yfe can, not conceive of its exikence as an effect.' We do not
niei;i^ however, thal of which we can not conceive, can have no extftence : all,
we mean is tha^e can have no knowledge of that of which we can not
conceive. And if no charfges whatever took place upon the earth', or in tlie
het'vens over our heads, we could, never gain' the knowledge of effect, and

* consequently wc could know notnjng of cause. If we consider pure sj^kcne,
we.w^il 3ee that we can not conceive of its having had a beginning, or of any
diaijge whatev<3r having taken place in its nature, and therefdr$; we can* hot
conceive of \t, as an effept.. The knowledge of change mu^t preceed that of
effect Ad c^use : and when we perceive that, the change has been produced
by something else than the change itself, we then have the knowledge of
effect ^um) c^vipC' We musl perceive., however, that the, change has been pro-
duced, or we do not come lo look upon such change as an effect. ' Suppose'
the first inhabitants of earth to ho'e looked upon, the moon and to have seen
ier undergoing in appearahce, continual changes, (and this they coiiW not
have avoided if they looked up) could they have evolved the tinitha of * effect and cause from these phenomena alone? We think they could not. If the

• first changes with which men became acquainted were those of the phases of the moon, and their minds were not yet familiar with the exertion of any power in nature to produce change, providing they really believed the old and full moon to be in reality changes in the same phenomenal dillefe* of the conparisio! of these diEferentia. would only evolve Ofceknc/wledge of change. But that this change was the effect of some cause* could not be evpyed from such comparison. ' ^

. Now the simplest change with which we are acquainted, and Which we can perceive to be produced, to be an effect, is the change of aggregate existences in space, i.e., a change of their wheres. Suppose a man should seeeonivy boll* strike against another; and send it other some distance through space; in such case he would see a change produced, an effect. He would perceive heterical wheres occupied at different times by the one and same ball which was struck, and also heterical wheres occupied successively by the string: ball: he would also perceive that some of the heterical wheres of the one ball and some of those of the other, became, at different times, homon (Greek — neuter singular: from homos, a, on: the same). If we contemplate the two balls we perceive that they are hetera and that their wheres are hetera J and when the striking ball makes hetercaV wheres. But so soon as the first ball strikes the secondone, some of the wheres of the one ball and some of these second one's wheres become homon, and from the impiesneterability of matter, this could not be the case without the second one having Vacated those wheres. In this case the change in space of the second ball is seen, to be as an effect, and the caUelse ii*asly perceived: The first ball commenced to move towards the second one until it touched it, and had it proceeded no further, no effect would have been produced upon the second one: but if it go on further, some of its wheres and some of those of the second must become homon, i.e., the wheres of the second ball at one time and the wheres of the first ball at another time, are in space, homon. Now one instance of change involving such relation: if a templated, would give us the knowledge of effect, and cans.1. ■

- -Bat a^ih, if we tie one end of a string Xo a perii|anent object and attsM'h* the other A|d to the one end of a lever, eveyj ppoint^n that string will occ<piyaT\mEBB, and the wheres of all the points inter 5fe be hetera^ The end of the lever to which the string is attached wii^also have a where, which, in reference to anypoint in the string, will be heteron. If now the string is taken away, some of the points in the string will take use wheres of other points, atti<6m* of thwCeresof the end of ^the lever, and some of the wheres of the string. Which were ^t first hetera, now become homon.. And helK'e we see that in all those changes of aggregate existences in space, which we^r'ard as effects asod whose causes we understand, we find heterical ex- fefenc*srivth heterical wheres, and some of the wheres of one and of another beebminghomoj^.' Change of objects in space is also produced by what is called attraction and re^HIsiion, bat -what arc the causes and modus operandi

in these changes, plii16s6phers have not yet a^iffiel'tly eKplained td us..^ The - connectionof hetera into liomon among whers is, the modns openuhdi in ^
those changes of objects in space, which we fail to understand. Take a piece of iron and keep it all the time for a certain period under your eye, and during this period move it with your hand from one place to another. In this case we perceive that the existence moved (the iron) remains one and the same; but its wheres successively and the times of occupying them can be discriminated, and so also respecting your hand. But some of the wheres of the iron and some of the hand's wheres can not be discriminated, they are homon, though the times of occupying them by each successively are never homon but hetera.

But again, we sometimes see the existence acting upon another and a constitutional change following such action. Take a hammer and with it strike a grain of corn placed upon a rock, end we will see that a constitutional change takes place in the corn. This change too, we could hardly avoid regarding as the first time that we s^uld witness the occurrence. And in this case, it will be perceived that two ical existences come into contact and that some of the wheres of one and some of the other become immobile: and Auiber that some of the heterical particles in the grain of corn become homon, mad heeoe the coo^utipma, change. The grain of corn possessing rigidity but thia gregariuin wtm de-*, stroyed by reducing heterical wheres of heteroal paittides to homon; On, the contrary ignite gunpowder and heterical 'particles, immediately take heterical wheres.

Again, if we take a piece of ice in our hand and it mdd end. beccn^e> water, here is a constitutional change; ice, an aggregate existensa, Im: changed some of its sn^garia and become water: and ip changing ,the». gregaria, heteriel wheres ot particles become homon. And in thiaeeae wo must perceive that the where of the two aggregate existencps, ice and water, remains the same for both; but the ex(stence» posseB^reg|He imtereediffiRT^ entia, and the times 6f occupying the same wh»e jpe lieten. And henene^ when there is during a certain period of tilhe but one where for Iwj0 di^r--

Again, if we take grains of white sand and consider them all to beccn^e> heterogeneous aggregate existence, where all the particles are inter se similar: and consequently the difference, all the particles can be heterated but the particles themselves opxildtdb.diffiBEmitiaMvlt now we mix red sand with the pile, we then find that It jpartkdfla which toe not only het^ra bat also differentia. The pile now, ^Imfori, ccmpared with what It was shows change. This change, however, if Wiliig:entiiiiBly to thx^ diange In spa^ ef the particles of red aif white

s-

^ftidoiiififtiUiiloiiififti^haog«. It, however, ooek agamand assumes Its fdrmer fV^gMrla.

Bat agaiBf if wo take grains of white sand and consider them all to--fetlfir iala piu) we ii^di hilve a homogenous aggregate existence,!, e., an folitfinoe is i^ich all tkQwericles are inter se simililia: and consequently Iie^"WilifireB 4tf. All the paitid" can be heterated but the particles themselves opxildtdb.diffiBEmitiaMvlt now we mix red sand with the pile, we then find toto It jpartkdfla which toe not only het^ra bat also differentia. The pile now, ^Imfori, ccmpared with what It was shows change. This change, however, if Wiliig:entiiiiBly to thx^ diange In spa^ ef the particles of red aif white
But, again, aoppose we take an aggregate existence in which all of the
particlet loetimilia, so far as we can perceive, but by subjecting it to a certain
pmceu(mLLead) tullt pfrtici;ea which we f"gardefd as slmilia have become
plainly differantia, irich is alWky th^ case in theahalyll of hoompounds,'
hflM ia ta Of ifbhonge of a ^differdent kind ifrom any of the former.

And again, suppose we take twoaggregate existences, in each of which
the partfctai intar ai are afaxtilla, but the partkiles-of the one and those of the
fAU^ are iiifiter ae disllrsrentia, and W' luit these two aggregate existences to-
lpitfer aikd And that all the particlics of each existence now, il compared with^
what they were then, mrt fn then and now ihter $e ^ifiereiitita, but among them-
ahrehreatny have all become Nowaiiiddita; here again is a change different in
kind from any of the former. This ^change always takes place when differ-
ent elements unite and form a compound.

The followinfl; therefore, appear to t>e the principal changes with
which we are familiar, viz: the starting an aggregate existence in an homoni-
cal WHEBS into heterical whbbbs, which is a change of place; the ^^^ange
ofV taeterieal ip^iles of particles into homonical wheres, and vice versa, which
ia= constitutialional change of the adhe§16n of particles inter se, as in crush-
lt|p|xldelipalistoti{ the cntnMlon^of slmilia into differantia, which is the
^TM1^alifi^f acomoond ;'aainUhe conversion of differantia int0 slmilia, which
ia=°eayBlhesia of elMients, having chemical afflinii for each ot\ier. Every
chaegenddeh takes ^tche'attonon" existencds of the non-ego involves theprin-
cipiiue of ihie dr kfibther oi the abttte examples, excepting changes in degree.
And IraiCan leaMy see that ^ne homonidal existence per se can not change,
Ijulthai tia change of any one ^istence is owing in part ^o some other exist-
#tee. - Eratrfr e^ange If dependent. Ad as change springs from the illations
ol^°stencas, within thsneTelationa must also be the cause of power to pro-
dnoe^ohangei Soidittm pars se does not posse% the cause of soda; nor does
}QpgiBeolitainiltwAhiii itself; but fhi)ni the telations of sodium and oxygen
^]|(|ib|p)|i4^Di^ida^of aoddim or soda. And we see that the knowledge of
ohwiga cornea into oui> mindaby comparison: and so also does our knowl-
ed^e of eiSect and cau^^ And without /the iuToluticm of koomoi atid h^tt<
or similia and differiator commensura and incomeosura, we can not««Tolv«
the knowledge pf. cause and effect, ' ..

T|iere is a change in the appearance of the iiifKi>Br there is alfid a
change in the state of the atmospl^re, by the cmpariabn of these changioB,
we have hetera and differentia,.but neither homoi^or suuilia. And fh>m these
things per se, Le,, from l^etexa and disliisrentia, or fromi hoMon and similia, or>
from hetera or.homon and commensura, weannot evoloe the knowledge of
cause and effect: If a rock fall from the clif of a mountain into the vallooy,'
and abaat the same time the ice break loese from the shores and float, down a
river, here also are changes, but they do not come together anywhere, s6 w
to bring hetera into ho{i^on, or vice versa ; similia intotliifi3reBtia,or Tioversa
; commepsura into Jenccmnsura, or vice v^sa; so that we can evfA^efrouv
their comparison an j^ect or cause. Hetera musi Qiet somewhere in hemwn
or vice ver^pr similia in differential, or vice versa; or commensura in in-
commensura, or vice versa; in order to bring to our mindl effects: a&d^
causes. ' .. , '.
Now of cause there are three classes rizi expended, acting and potential. Causa striarum of the rocks is an example of an expended cause*: The floating icebergs, as believed, striated in their course the rocks. But they have vanished and ceased to be. The flowing of the water in the river is an effect of an acting cause, and gunpowder unexploded is an example of a potential cause.

Chapter Vm.

Names.

We come now to the consideration of names, where we are and shall be. Words, we must necessarily see to it, that our words have some definite meaning, otherwise we will but veer about without purpose and make comparisons in such a manner as will evolve truths. In the common affairs of life we reason either well or ill, and lead ourselves into our trains of thought and response by the use of words. Some have words to do with reasoning, that Archbishop Whately concludes, the science of reasoning, to be entirely conversant about language: a mistake similar to that of supposing the symbols of Algebra to be the only things about which that science greats. But the relations of existences inter se are subject-matter of the science of reasoning and of every other science. And as words are used to designate the results of these relations, the words themselves must subjectively bear some relations to each other and to the existences which they are used to designate: and so far as they are broligbit by the mind to play a part in the relations of the ego to the non-ego in reason.

liig^ their 4tё the subjects of the science of reasoning. And after what has alresEdj been said in the previous chapters, we do not thing it will be very difficult to understand the functions of words in the processes of reasoning. "We have already seen, that hetera lie at the very foundations of our knowledge. That which is in relation to the ego, that it may be an object between which and the ego, some truth depending upon such relation may come to our knowledge, we call an existence. And words when spoken are to the ear signs of conceptions of the person speaking them; when written on paper they are signs for the eye. And when existences come to our knowledge they are signs by the power of the mind to evolve the relations among which it is placed into hetera, these heterical existences are known only as existences; and no one of them is distinguished from another except as separate existences. And when we consider one of these heterical existences independently of its relations to others, and we wish to set out a word as the sign of our cognition, we use a name to call to the mind of the hearer or of him who sees the word written, one of hetera, without distinguishing in any manner this one from others. ..."

And hence words, for logical purposes may be divided into two classes, viz: names- which are used by us to distinguish existences inter se, and Mines used to call to the mind existences without distinguishing them inter se. To tw later class belong such words as existence, being, thing, entity^ phenomenon, etc. These non-distinguishing names are few in number in all languages. And taking up the second class, i.e., names used by us as signs to distinguish existences inter se, we will notice those few in number, "Wficicli distinguish hetera inter se. Names to distinguish hetera inter se are stdh i^drdsk the following: this and that, thesaand those, once, twice, first,
Second, *^go and non-ego, etc.

-■ But every conscious existence has a where, which it occupies, and the relations of wheres occupied by conscious existences are expressed by prepositions. The where however, and the conscious truth which occupies it, are "differentia. And we will, perhaps, be better understood, if we sub-divide that islass of nines, which distinguish existences inter se, into six classes, viz: names of homon, of hetera, of similia, of differentia, of commensura and of immortosuraj' and keeping this sub-classification in view, we shall treat of them somewhat promicuously.

Kowltmust be evident that sometimes a simple word is used as a name as iron, glass, ice, etc., and sometimes names are compound words, as bydropIiobi0, `t(J. All those words, which by grammarians are distinguished as nttins, are names. Some of these are names of simple existences as red, tasti' sound, etc., and some are names of aggregate existences as iron, wood,, coal, shiti, etc. And all those words too, which are grammatically adjectives, arelogically but names of the gregaria of aggregate existences, in the ex-

pressioD/"A red house," the word red showa that thlsf%cia,1|^fgar4aioi is one of the gregaria of the house, and of thig facial gregariurn, it 1? *th^ name. And all adjectives of the positive degree whQujoiAed to.a. a^gr^gr"f,t" existences, name some one of the gregaria, facial or caffi^iaU vftllich,' alon^ with others constitute the 4^eculiar aggregation yarne by the xieua to y^4^ the adjective belongs. In the expression » "A good man," t^ie n^n rh Q^ i^ the name of an aggregate existence, and the^ word 'good^' which if rajj^odi with it, is the name of one of the capacial gregariza BXipf^pd to be ^n/^1^ aggregation. "A fusible metal," is an expression of the|aax9e j^d. A2i44I it is to be remarked that those adjectives which' ar^ the names ot facc^ grega-garia may stand alone lis the names of either the subject^ Qt or predicate j^x^f ^ proposition: while names of capacial gregaria require, i^ei^a1ljyjn qju' language, the names of existences in which the gregaria i^amed bj ^eJba^ ;3xver ally, are aggregated, to go along with them when thej tyre n^ad'e , ^j]^ subject of a proposition. "We can say that white or red isa. coli.r; 'but wO, can not say that a rbund is on the table, and we should rather fj^f a."OHi^d-thing is off the table. And when we wish to use such wprds, "^hlic^ are (be. names of capacial gregaria, as nam's by themselves in the^ subject of proposi-

the article a or AN is continually used in logical pi;opositiona4ii;i^;^ always has' a> significance.. This article is the name of ^n heterical .rf )S ttpa :

itisisntried from anb; German ein, and means oixi^'. Axtd tik^refQf[eg\ip expression, "A red house," contaigs three names viz: house, the name 9C a^ aggregate existence; red, the name of one of itis gregaria, and ▲ (ooie), i]j^ name of the numerical relation of the house. The article tse, is th^i A^t. of an homonal relation, and itis used to distinguish ho^xp^fj from betera: as, "This is the horse which we saw yesterday," "Thou art the ipan^M f",^ Sometimes the adjective mme and also the word sex^e; are u^eda`opf with t^ , noun to which the article refers: as, "The same. horse/" "The gate iti]^ffi,^ The articles, however, can not be used alone, either as Uie subject ^r prji^t^- cate of a proposifion which is concerned about anything el^ than napieg. ^

niej, however, frequently appear in propositions along with ott^ nWI%.; and th^ir ftinctions, therefore, ought to be understood. ^ ::;
Prepositions are the names of relations among existences in space: as, "The log under the bridge," "In the house," "Over the river," "Beyond the tree," etc. Adverbs are the names of relations of time and space and modes of action: as here, there, then, formerly; bravely, diligently, etc. We do not propose to treat of words any farther than it is necessary to the understanding of reasoning, and we have said enough about simple names for the present.

But frequently several words taken together make but one distinguishing name: as "A red color" is the name of a single and simple existence. Again, "Charles Carroll of Carrollton" is but one name. And "The miller who ground the grist yesterday and who died to-day" is but one name, and, after it we may add, "was a man of benevolence," another name. "In the house" and "By the sea-side" are distinguishing names of heterical wheres. Such names are called by logicians many wounded names.

But again, a collective noun or name stands as a sign to distinguish an aggregation of aggregations: as, the assembly, a multitude, a battalion, regiment, etc. And when such names are used, it is usual and frequently better for the sake of perspicuity, to connect the name of an aggregate existence, which with others of the same kind make up the collective aggregation, with the collective noun: as the assembly of the people, a multitude of women, a regiment of geese, a society of prairie dogs, etc.

Again: a general or common name is one used in the first instance to distinguish an individual existence, either simple or aggregate, which has been differentiated or incommensurated from others: but each of those existences, which, with the first existence named are familia or commensura, must receive the same name, and therefore the name becomes general or common. A common name is the name of familia or of commensura. Existences inter se similia never receive a name other than a common one* for each individual, for the simple reason that, after we have distinguished them into hetera there is nothing by which we can distinguish them further. We may call them 1st, 3d, 3d, etc., but such naming distinguishes them merely into hetera. And in order that any existence may be given a name to distinguish it from others otherwise than heterically, it and the others must be inter se differentia. If we take ten grains of corn inter se similia, and call one Alpha, another Beta, another Gamma and so on, our naming has amounted to nothing; for so soon as our eyes are turned away from them and they have changed places, we can not afterwards tell, which one is Alpha or Beta, etc. All those existences, therefore, which can not be discriminated by us further than into hetera, must from a mental necessity, when not numerically considered, receive from us a common name. But it may be said—that horse is a common name, yet horses can be discriminated. This is true, and then they also receive distinguishing names; not indeed, to distinguish the individuals from objects, which are not horses, for the name horse has already done that, but to distinguish them inter se; as black horse, white horse, Arabian horse, the horse with short ears, the near horse, the off horse, etc. In like manner color is a common name, yet colors inter se can be discriminated into differentia, which receive distinguishing names, and which names may also be common names, and they will be, if any color, discriminated
Now if a man should place before himself a horse, a tree and a stone, by examining them, he would perceive, that the one possessed the capacial gregarium of animation; the other the capacial gregaria of vegetation, and the last, capacial gregaria of a different kind from either of the former. These three objects, therefore, would be iner se differentia: they are the three aggregate nominal truths, and we may distinguish them iner se by the names animal, vegetable and mineral. And afterwards every object possessing the capacial gregarium of animation and the horse, as aggregate nominal truths, would be similia, and therefore it must be called by the name animal. Animals, however, may be differentiated into aggregate primary propositionab-truths, and so on in a like manner, which, we saw was persued. With those simple existences, which we call facial gregaria grounded in the non-ego. And it must appear, that if every aggregate existence, with which we are acquainted, possessed the like number of facial and capacial gregaria, which were inter se similia, aggregate existences could only be discriminated into hetera, they would all be similia and they could have but one common name. But the facial gregaria inter se differentia are many and the different capacial gregaria are innumerable; and could we find an aggregate existence, in which all the facial and capacial gregaria excepting one were like those of gold, yet as it differed from gold in one respect, it would be differentia, and consequently it would have to receive a name to distinguish it from gold and other things. Common names, therefore, are the names of the individual existences severally, which upon one and the same generalization of existences are similia or commensura.

A proper name is the name given to a single existence to distinguish it from all others in the universe. And it must be perceived that, besides the capacial gregarium of animation, which distinguishes animals, animals are made up of various other gregaria, both facial and capacial, by which we can easily distinguish them inter se. And after that we have sub-divided them into species, we are still able to distinguish the individuals of the same species. Take for instance, the species or genus homo, and after that we have divided this species into the five races, we can easily distinguish the individuals of the same race. Nature is so fond of variety that, in the largest cities two men can seldom be found, who are in all respects similia. And this variety of gregaria outside those upon which the generalization, in respect to which men are similia is made, enables us to impose with effect proper names upon individuals. Daniel Webster, outside of those gregaria which made him and other men inter se similia, possessed gregaria facial and capacial, by which he could be distinguished and known from others. City is a common name, and yet every city, besides the juxtaposition of houses, is distinguished by the proper names London, Paris, Philadelphia, etc.

Correlative names are the names of existences so related to each other that the mention of one suggests the relation: as father and son, husband and wife, mother and child, cause and effect, king and subject, etc.

A concrete name is the name of an existence grounded in the ego and considered with reference to its ground in the ego, or of an existence grounded in the non-ego and considered with reference to its ground in the non-ego; in other words the existences (for names in themselves are not concrete or abstract) distinguished by what are called concrete names, have their iccations in the ego or in the non-ego, assigned to them by the mind.
When their names are spoken, and therefore, they are concrete; and from this circumstance the names of such existences are called concrete. An abstract name is the name of an existence for which the mind assigns no location, but merely views the existence subjectively, without determining its ground either in the ego or non-ego, as whiteness, fusibility, roundness, etc. The adjective names of facial and capacial gregaria, such as white, red, sweet, fusible, combustible, conscious, etc., are generally concrete; and when the existences for which they stand are to be viewed in the abstract, we change these names grammatically into nouns: as whiteness, redness, blackness, consciousness, etc. We may however use adjective names to denote abstract existences, as white is not black, i.e., whiteness is not blackness.

Names have been divided into positive and negative. This division, however, is made altogether from the combination and appearance of words, and not from the functions of words as names. The division made by Aristotle into definite and indefinite is a much better one: as definite white, red, man, horse, etc.; indefinite not-white, not red, not man, etc. Definite names, then, are names of individuals separately, or of the individuals severally of a class; and indefinite names are the names of anything not denoted by the definite name, which is always part of the word used as an indefinite name. The truth is that such names as not red, not man—nothing, non-entity, etc., can have no existence in any language independent of propositions, they spring up in propositions, and in order to understand them, we will have to treat of propositions. There is also another set of names, such as blind, mute, deaf, etc., which have been called privatives; they certainly exercise the functions of names, but we can understand them much better after having treated of propositions. It has been usual with writers on logic to treat explicitly or names and their divisibas, and we have said this much by a kind of duress, although after names have been divided into names of hetera, homon, similia, differentia, commensura and incommensura, we deem other divisions of no great importance.

Note.—It seems necessary at the end of this chapter to notice briefly, what we regard as erroneous in the chapter on names in the work of J. Stuart Mill on logic; not because we wish to find fault with Mr. Mill more than others, but because Mr. Mill is one of the strongest writers upon logic in the English language, and the futility of the subject is, therefore, best shown from his work. On page eighteen of the edition published by Harper & Bros., he says, "A general name is familiarly defined, a name which is capable of being truly affirmed in the same sense of each of an indefinite number of things. An individual or singular name, is a name, which is only capable of being truly affirmed in the same sense of one thing."

Again on the same page, "A general name is one which can be predicated of each individual of a multitude; a collective name can nowhere be predicated of each separately, but only of all taken together." Now upon the foregoing, we would remark that a name cannot be affirmed of anything; for, every expressed affirmation is contained in a proposition, and that, which is affirmed in any proposition, cannot be a name, as we will see, when we come to treat of propositions in chapters X, XI, XII, XIII, XIV and XV. Mr. Mill, in his explanation of names has all the time had in view the generally, we may say, the universally received hypothesis that, in propositions the predicate term is affirmed or denied of the subject, or that the thing denoted or connoted, to use a term of Mr. Mill and the schoolmen, by the predicate term is affirmed or denied of the thing denoted or connoted by the subject-term; a theory which we hope to be able to show hereafter to
be entirely erroneous^ and which has.led Mr. Mill and other eminent writers into erroneous conceptions of names. But again on the same pag6 as be-
fore, "A concrete name is a name. which stands for a thing; an abstract name is a name which stands for an attribute of a thing.'^ And hence the name of an attribute of a thing, is the name of nothing, unless an attribute be a thing of a thing. But- on page thirty-two he tells us that, "When, we have occasion for a name which shall be capable of denoting -miateyer exists, as contradistinguished from non-entity or nothing, there is hardly a word applicable to the purpose, which is not also, and even more familiarly taken in a sense, in which it deaotes only substances. But substances are not all that exist; attributes, if such things are to be spoken of, must be said to exist: feelings also exist. * Yet when we speak of an object, or of a thing, we are almost always supposed to mean a substance. There seems to be a kind of contradiction in using such an expression as that one thing is mere-
ly the attribute of another thing." From this, it seems that Mr. MilPs defi-
nitions of concrete and absPfact names ought to have read: a concrete n^e is A name which stands- for a substance; an abstract name is a name, which stands for an attribute df a substance : for, otherwise, if both substances and attributes tire to be called things, then a concrete name, according to Mr. • Mill, covers these and leaves abstract names without an object to light upon. But Mr. Mill would scarcely agree to this change of words in his sentences ; for, he tells ils that, "White also is the name of a thing; or rather of things." Mr. Mill,, we presume would not go so far as to call white a substance, but would connsider it rather as an attribute of a substance. . Yet in the next sentence he tells us' that, "Whiteness, again, is the' name of a quality or at-
tribute of. those things" (whites). Thdt whiteness is the attribute of white is certainly strange enough. But he w^ould probably say that, whiteness is^ not the attribute of white, but of white things; for on the next page follow-
ing the former he tells us, "When we say snow is white, milk is white, linen is white, wc do not mean to be understood that snow, or linen, or milk is a
color. We m^an that they are things having the color" (white is their attri-
bute). **The reverse is the case with the word whiteness; what we affirm to be whiteness is not snow, but the color of snow." Well, whiteness then is the name of the color of snow, but such being the case what is white the name of when we say snow is White ? It may be answered that white is the name of snow itself and of all white things, as Mr. Mill has said pre-
viously. Well then, if such be the case, what is snow the name of? Mr. Mill's language is merely a jargon. But Mr. Mill proceeds to divide names into conirotive and non-connotive^ and this division he considers of the most
importance, "And one of those which go deepest into the natiare of language." . *
*A non-connative term is one which signifies a subject only, or an attribute only. A connotative term, is one which denotes a subject and implies an
attribute. By a subject is here meant, anything which possesses attributes. Thus J^ohn, London, England, are names which signify a subject only. None of thce names, therefore, are connotative. But white, long, virtuous, are connotative. The word white denotes all white things, as snow, paper, the
foam, of the sea, etc , and implies, ortis it was termed by the schoolmen, con-
notes the attribute whiteness. The word white is not predicated of the attribu-
ture, but of the subjects, snow, etc. ; but when we predicate it of tiiem, we imply, or connote that the attribute wiiteness belongs to them." Kow in the above sentences, the misconception of the meaning of propositions first spoken of by us, is commingled with the contusion respecting concrete and abstract names, which we noticed a moment ago. We do not wish to fill our book with strictures upon the woTks of others, which is apt to be regarded
at best as sensorious. The best way to cure errors is to bring forward the truth and let it be examined. And we repeat the remark that all divisions of names, after that they have been divided into names of homou, hetera, similia, differentia, commensura and incommensura, are of but small importance for the purposes of explaining the reasoning processes. These classes have at the foundation and are used in assisting the understanding in drawing its conclusions; the other classes are useful, if useful at all, merely for the purposes of distinctions in mentioning things, but they do not assist, but rather impede, the progress of science.

CHAPTER IX.

classification of PROPOSITIONS.

In the previous chapters, we endeavored to obtain classifications of those objects with which we are familiar, and to treat of names used to mark and distinguish truths. And it must have been observed, that what former writers have called attributes we call existences, and when these existences co-exist, we name them gregaria. Among most logicians, and especially among the schoolmen, what they call attributes are said to inhere in a substance. But of this substance in which attributes inhere, we have not been able to gain any knowledge whatever independent of the attributes. And we regard the name ATTRIBUTE as calculated to mislead, and therefore we do not name it at all. And a substance stripped of gregaria is unknown to us; independent of the capacial gregaria, we know nothing of the ego, or of any mind; and stripped of facial and capacial gregaria, we know nothing of matter.

And the gregaria, of which we know something directly, may with as much propriety at least be called existences, as those things which, from our knowledge of gregaria, lead us to suppose to be in some manner, "we know not how, the causes between the ego and non-ego, of those gregaria. We are able to say with confidence that one thing per se can not be a cause, i.e., no change or effect can come out of it. We are able to say with equal confidence that red, white, sweet, etc., have not always been to us existences, but that with us they had a beginning; and therefore we conclude that our mind in and of itself must be something, and that there are other somethings, whose relations to the mind cause these existences, which we call red, sweet, etc.

Now when men were forming language, they were endeavoring to distinguish by the names, which they hit upon, certain truths which had come to their minds. But if their names do not point out clearly to our minds, well defined truths, we lay them aside and endeavor to supply their places with more suitable instruments. And it must appear evident to every one that had any person attempted to compose a treatise on logic in the infancy of language, in order to have succeeded in stating what is now known about it, he would have had to run away ahead of his generation in the knowledge of things, and to have invented and explained terms which have cost the human intellect ^es of labor to furnish to us. But happily for us the laboratory (# thought has been vigorously operating for many a thousand years before we have been called upon to enter the arena of mind. Instruments for stamping truths have been prepared to our hand by nations, each independent of the others. And although language always has been and always will be behind the wants of a people who push their inquiries beyond the already occupied fields of knowledge; yet the advance usually proceeds with so gradual a pace, that there is not much difficulty usually, in forming the 
Now in the preceding pages, we endeavored to show how we obtained and classified the truths of which we treated: we also applied the names used for distinguishing them. At the same time, therefore, that we were tracing the processes of the mind in gaining knowledge, we were also furnishing and setting down the signs by which to distinguish the knowledge obtained. And if words, as it has been said, are the forts established to guard and keep, mental acquisitions, we should expect a writer, who puts his truths carefully into groups for future use, to fortify them with proper terms, as he passed along. This we have endeavored to do as well as we were able; and then we took a view of these names or forts. We must proceed, therefore, to connect those names, or forts, together and consider the results. This

I""- done by the use of propositions.

not t'h. ^ proposition, in general, we define to be the result of the comparison ingthe"i"" ' by the mind and expressed in words; and undpr ttis

is while,

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gCDcral defiaiti^ii of proposition we make two classes of propositions viz: logical and conclusional propositions. A logical proposition is one in which the result of the comparison between two existences made immediately by the mind is expressed in words; a conclusional proposition is one in which the comparison between two or more existences is made immediately by means of a particular existence or existences and the result of the comparison is expressed in words. The sun is an existence, fire burns, snow is white, etc., are example of the first class. In each of these propositions there is a mental comparison immediately made between two existences, and the result of the comparison is expressed in words. The expressions; the sun is and the sun is an existence, are equivalent: fire burns, is equivalent to fire is the cause of burniuor sensations: fire itself is the effect of chemical affinities. And hence every proposition fully stated requires a subject and predicate, i. e., a name to distinguish the truth upon which the mind first, looks, and also a name to point out the truth connected with the first in comparison. The comparison may frequently, by a mode of speech, be expressed by using thaname of the subject only with a verb: and in such cases the other existence compared is suggested and compared by the verb, i. e., the verb both points out and compares the predicate with the subject. This is generally the case, when the subject or first existence considered is the reputed cause of the second one: as fire burns, ice cools, the sun shines, the mind thinks, etc. This is also the case when the first existence is looked upon as the subject upon which some effect is produced: as beauty fades, water runs, leaves fall, etc. But all such propositions may be made by wording them differently to set out a subject, a predicate and a copula, i. e., in each of which propositions, two well defined truths shall appear, the one as subject and the other as predicate, with a copula to express the result of the comparison. The verb used in our language, as the copula, may always be made to be some part of the substantive verb to be; as ifow is while.
Now respecting the meaning of this copula in propositions there has been much dispute among authors. When we say that the sun is, we mean that the sun exists is an existence. This, indeed, is the primary meaning of the verb to be. But besides this meaning authors tell us that it has another; as when we say John is a man; they tell us we use the copula is merely as the sign of predication. And although in the proposition, the sun is, they tell us IS is a predicate of itself, yet when a name is placed after it, it then passes its predicatable quality over to that name. All this is certainly somewhat obscure. For when we take from the verb to be its primary signification and call it a sign of predication, what do we mean by this expression? We mean, say our authors, that the copula affirms one thing of another. But I do not see that any more light has been thrown upon the subject by the change of phraseology. As we say that ice is frozen water, according to this explanation, we affirm frozen water to ice, when in truth frozen water and ice are the same thing, and therefore, in truth, we affirm itself of the subject. But if it be explained by saying that the copula shows that the subject possesses the predicate, or that the predicate belongs to the subject, as it is usually done, we answer that this explanation explains nothing. For, according to this doctrine, ice possesses frozen water, or frozen water belongs to ice—a mere jargon of words. But it is said that the employment of it (the copula) as a copula does not necessarily include the affirmation of existence. From such a proposition as this, "A centaur is a fiction of the poets," where it can not possibly be implied that a centaur exists, since the proposition itself expressly asserts, that the thing has no real existence."—J. Stuart Mill. To this we answer, that a centaur has a real existence, nor does the proposition assert the contrary. Its existence, however, is grounded in the ego, as the proposition asserts, "A fiction of the poets." Although modern logicians have arrived at more certain conclusions, in very many respects, yet in their expositions of propositions, they are as much at fault as the ancients. The truth is that the verb to be as the copula in propositions, maintains its primitive meaning in every instance, nor can it be shown to have any other in any case. We may, indeed, say that it is merely the sign of predication, but when we come to examine closely this expression, we will find it to be merely words without knowledge. Such expressions as these, snow is white, John is a man, leaves are green, etc., were brought into use before philosophy had made a beginning; they are natural, short and convenient modes of expression and explicit enough for the wants of mankind in communicating thought in a general manner; the philosophic interpretation of them, however, by writers upon logic, we regard as erroneous. But we must defer the further consideration of the copula until we come to the interpretation of propositions, when we hope to give a full and clear explanation of the whole matter; and we have merely adverted to the subject here, for the sake of order, and to put the reader on his guard against what we consider errors.

From the supposition that in all propositions* there is something affirmed of the subject in certain cases, and something denied of the subject in other cases, writers have classified propositions into affirmative and negative. But this classification, in our view, is unscientific and built upon a sandy foundation. Every proposition, indeed, expresses a discourse of the mind, which may be denied or contradicted. But if we place before our mind a single existence either simple or aggregate, red for instance, as the subject of every proposition must be, we can deny nothing of that existence: if we say anything at all about it, we must make an affirmation. Take the two propositions, John is well, and, John is not well: and if we consider the
one as a reply to the other, there will, indeed, be a denial; but contemplating

either one of them as independent of the other, and it contains an aflarma-
tion. And further, if this appealar obscure, we may aalc ourselves, whether
both expressions are really propositions, and if. they are, then they must have
something common: proposition must be the genus of which each is a
species. If they be differentia, and yet in some generalization similia, they
must have been differentiated from the higher class in which they were
similia. But if we say that the one affirms something of something, and the
other denies something of something, as is done, they then have nothing in
common, excepting that each has a subject and a predicate, i.e., one existence
before and another after the copula. But if the names of the two existences
compared in propositions be set down, as may always be done, and we dis-
tinguish the one from the other by calling the one the subject and 'the other
the predicate, this is merely a classification of the terms, and terms alone do
make a proposition, lhe classification of terms, therefore, can not be the
thing in common, which unites all propositions in a common class. But if
some propositions affirm and others deny, these things (affirmation and de-
nial) are differentia, and there is nothing left in which the propositions can
agree excepting the classification of terms. In the two propositions "A pear
is a fruit," and, "An apple is not a pear," we consider that there is no denial
in either case, both are affirmati's; though this doctrine will, no doubt,
'sound strange' to those indoctrinated from the books upon logic. They
affirm, however, results which inter se are differentia. This doctrine will be
easily understood after that we have treated of the interpretation of propo-
sition^7

* * What we consider, therefore, the proper mode of classifying proposi-
tions is by the differentiating of the results affirmed. We defined a principal
proposition to be the result of a comparison made immediately by the mind
between two existences expressed, or affirmed, in words: Affirmation, we
consider, is the very thing in common in all propositions; but the results
affirmed are differentia. And these results, we find, may be discriminated
into six classes, and therefore, we make six classes of "propositions, viz:
homonical, heterical, simillcal, differential, conmensural and incommensural
propositions. It is not necessary that we should take up each of these classes
and give them fuller attention here; for we are only classifying preparatory
to a thorough investigation hereafter. Some things have to be merely stated
at first, so that the explanation when it comes, may be understood.

Now each of the above classes might, apparently, be subclassified into
simple and complex propositions. A simple proposition, then, would be one
in which one subject is compared with one predicate, as "John is a boy."
And a complex proposition would be one in which one and the same subject
is compared with each of two or more predicates; or in which one and the
same predicate is compared with each of two or more subjects; or in whic<
James is wise." "John is not good," is a simple proposition of a different kind, and. "John is neither good nor wise," is a complex proposition of the same kind. And "All the Apostles were Jews" "All the boys in the house are barefooted," etc, are complex propositions. The classification of propositions into simple and complex, however, is not a classification of propositions, as such, but rather a division of them according to the number of prepositions expressed and employed in a set of words which contain but one verb. 

But again, propositions have been divided into pure and modal, as "Brutus killed Gassar," (pure) and **"Brutus killed Caesar justly" (a modal proposition). This division of propositions is made merely from the appearance given to propositions by the wording of them, and it is not a division of propositions, as such, at all. The sentence "Brutus killed Caesar justly," contains a result which will be exactly expressed by another set of words, as "'The killing of Caesar by Brutus was just'" a possible proposition. The division has no foundation, whatever, in the nature of propositions, but rests entirely upon the wording of them. 

But again, propositions have been divided into universal or general, as "All men are mortal"; particular, "John is mortal"; individual or singular, "A man is mortal"; and indefinite, "Some men are strong". We, however, reject these divisions, as divisions of propositions, as such. The words aic, EVERY, sozICE, etc, joined to subjects or predicates qualify them and make them a certain kind of subjects and predicates, but the affirmation is made in such propositions, just as it is, where these words are wanting. These words, therefore, qualify the results of comparisons only by their qualifying effect upon the existences compared in propositions, the manner of making the affirmation is in no way affected by them; they belong to subjects and predicates and not to the result affirmed which is the essence of propositions.

The sub-classification therefore, which we will make. Is into categorical and hypothetica propositions. A categorical proposition is one in which a certain result is expressed as actually existing in the relation of existences, as RED is a color, red is not green, etc. An hypothetical proposition is one in which a certain result is supposed to exist in the relation of existences, for the purpose of drawing some conclusion from it; as "If a sheep be a horse, (hypothetical) a lamb is a colt" (conclusion). Tliis' whole phrase would be considered hypothetical by writers upon logic. The hypothesis, however, lies iEftlie first proposition, "If a sheep be a horse," the 'latter sen-

51 tence is not hypothetical, but a categorical conclusion, which expresses a result flowing actually from the hypothesis; but the hypothesis being false the conclusion depending upon it must be false also.

Now before leaving logical propositions, we must say a few things about subjects and predicates. Subjects may be divided into mmple and aggregate. A simple subject is a single existence per se, as "Red is not gseen," here red is a simple primary propositional truth. An aggregate subject is an aggregate existence, as **"Iron is hard." Here ikon is an aggregate existence made up of certain facial and capacial grepania enterin'g into a kiud of fasciculus, which gregaria are the things in fasciculo for which the subjectyje term .stands and which it distinguishes. Efedicates are divided in ' like manner. This is all that we need say at present respecting subjects and predicates: when we come to unravel the meanings of propositions, we will have to consider subjects and predicates more fully. And this brings us to
notice logjpal conclusions, or conclusional propositions, about which we will say but little at present as they will be tI:^ated again hereafter.

A logical or ratiocinative conclusion, as -already said,Js a proposition in which the result of comparisons mediafelj^ made by^means of c^tain ex-

istences, is expressed in words. In a logical proposition the result of the comparison made iMM,j:DrA.TELY between two existences is expressed in vvords ;

but in a conclusional. proposition the result isnotderiTedfrom theIMMEWATE

comparison of two existences, but miediately, as A is equal to B, C is equal to A, and therefore C is equal to B.(a conclusion)'. In the last proposition,

which is a conclusion, the comparison between C and B is not immediate, but

mediate by the means of A. This distinction between logical propositions

and conclusional propositions is important to the clear understanding of

logic : for it is evident that a concluBiorr once gained may be made the

premie in a subsequent syllogism, and unless we understand this4istinction,

, we will not know how to get to the bottom of the reasoning process.

All those propositions which have been denomiwited modal, by writers,

• are conclusional propositions, as "Brutus killed Caesar justjy" is a conclusion.

And much' of what we have already said about logical p'ropositions, will

apply to conclusional propositfons, we need not therefore, repeat it Propo-

sitions, which are called disjunctive, alpo, tire not logical propositions proper,

but conclusions,^ the premises of which are often not mentioned ; as "John is

either a knave or a fool," is not properly a logical proposition, but a cobcKi-

sion drawn from some premises, which are found in and can be made out of

John's actions. What have been called hypothetico disjunctiv* or dilematic

propositions, also, are coDclusions, as- we will more fully see and explain

hwcater. '

In this chapter we have endeavored to classify propositions so that we

may be more easily understood in our subsequent inquiries. All truths,
compare is no part of our undertaking; but that it actually does compare, among the existences which are the subjects of its cognitions, and' hence gain 'inowledge by the comparisons, we think, has been sufficiently shown already.

Now when the mind has gained knowledge and clothed this knowledge with words, i. e., given it as it were, a body to render it visible to others, the knowledge gained, indeed, is thus made appreciable to others, but the opera- tions of the mind in gaining that knowledge, leave no trace behind. And did every proposition clearly exhibit the two existences compared, and also their 'result' or truth gained by their comparison, propositions would need no interpretation, for each one would fully interpret itself. But the men who commenced language, were seeking merely for an instrument of utility in the common affairs of their lives, in which clearness of detail and precision of expression were of less importance than general availability and dispatch.

And therefore, in every language, the truths which are really compared in propositions are sometimes but dimly shadowed forth, and the result of their comparison always but obscurely shown by the form of the words. And this makes it necessary, in order to obtain a thorough insight into propositions, to show what the two truths compared really are, that the result of their comparison may be clearly perceived. To this task, therefore, we now proceed;

And we win comtance witli, the examlaalioa of homoalical proposiUoas.

Take the proposition "Red is red," and let us endeavor to clearly set out the two things compared and the truth, which is the result of their comparison. And first, we must observe that an existence which is absolutely the same existence can not be two existences, and that one thing per se can not be compared at all; two existences must always be found in every proposition. We must also observe that when we have the knowledge of an existence, we can always make some discrimination respecting that existence: without discrimination we can have no knowledge. Plurality of existences is necessary to our knowledge of any one; and, therefore, absolute-oneness or identity is not within our knowledge: every truth of which we have any knowledge is evolved from relations. But how then can we say that "John is John," or what is equivalent to this, "John is himself"? In order to understand this it is necessary to recollect that some truths are grounded in the non-ego and others in the ego. If we look at a tree, the relations between the tree and the ego bring to our knowledge an existence (a tree) grounded in the non-ego, and also an internal existence grounded in the ego. Now simple existences can only be discriminated by their wheres, by their times and by their effects. Many effects upon the mind are inter se similia; thus if we look at an inkstand to-day, and to-morrow look at It again; both to-day and to-morrow it will produce effects upon the mind exactly similar: yet these effects will not be the same, they will not be homon, for they can be discriminated by their times. But similar effects, upon our minds can only be discriminated by their times: and where there can be no heterotipn of times made, there can be but one and the same existence grounded in the ego, similarity is lost in identity. And we must always recollect that by the ego, we mean my mind for me and your mind for you. For should I and a thousand other persons, at one and at the same instant of time, look at an object and be affected by it exactly alike, yet to me only one of these effects would be grounded in the ego: and all the effects upon the minds of the others in respect to myself would be grouped in the non-ego. Simil...
whoif^times can be heterated, are not one and the same, but isepaerate exist-ences: they are hetera. But with respect 4o truths grounded II\lthe non"io" though their effects \jpon the mind may be exactly similar, or to c)jange the form of expr^ion, these truths may exactly resemble each other, yet if their Wh"BS can be heterated, they are not the same but separate existences. If three mea receive mental impressions exactly * similar, yet any person can heterjate the whbrbs of these effects and therefore the effects are not the same* Dissimilar truths grounded in the noq-ego, or. in the ego, can be discrimi-nated into differentia, they can be differentiated ; but aimiliur truths grounded in the non-ego, whose wheres can not be heterated, are to us fhesame. If

we should see a rock of a paTticular ebape and color to-day in one place, and to-morrow see a rock exactly similar in another place, the only thing which would enable ua to know that these two rocks are not the satne, H that the present whqres are hetera. If we should find out that the firi^t rock was no longer in its wonted place, and w^ could not tell the Where in which it flyw is, we would most likely conclude the second one to be it. Hespecting simi-lar truths grounded in, the ego, therefore, the heteration of their times alone destroys the identity : vespeetiug similar truths grounded' in the . non--ego, time being' the same, ti)e heteration of their wheres destroys th« identity. The power of the mind to heterate depends gpon thp" time and space.

Aad now we look at John and receive a mental effect, and again look
at him aade receive a similar effect, the times of these effects can be heterated, and hence there are two similar existences grounded in the ego, which can bo compared with each other. But if we project these existenoea and ground them in the non-ego, at the very time we last looked at John, we knew of but one where for these two subjective existences to exist objecCively, and hence no heteration, objectively, of their wheres can be made; and, therefore, as they are `ubjectivsly simih, they, are objectively to us homon: and hence we can say that John i» John, or tha4; John is himself. The mind can ftlsco gain a truth grounded in the non-ego and afterwards recall it by what we call memory i and as ofteii as the mind does thus recall one and the same objective truth, so many subjective truths inter se similia, but not identical, will pass through- the ego, any two of which may be compared and" projected. And respecting the projection of truths from' the "ound of the- ego iyt\o that ot the nour^ego, *wo have already seen heretofore, ho^y existences are divided, by the ifiind into those grounded in the ego and those grounded In the non-ego. *

And hence the meaning of the proposition "^John is himself,** is that John, grounded in the non-ego, and himself, grounded in the non-ego arc the same thing; John and John. who are subjectively hetera are objectively homon. We may say that Johnis himself are the same thing, or thattJofan and fiimself exist IQentically, or that John exists as himself: whatever: may be the words, and thir syntactical relations, the two subjective existesdes, each of which j^e call John,* are'-objecttively the same, and what is affirmed by the proposition, is homon. None of these expressions, however, mark in wordi.with entire ftiliness the whole of the mind's operations, but merely state Of set down the existences compared and affirm the result of the copi-parison. And in a large class of propositions," all of that class, which" we have called homonical, the result of the comparison made by the mind is homon, homon is the thing affirmed. This is always"hecase in those propo-^ sitionhs which deflim words, i, e., in which 'the meaning of^ a word is ex-plained by some synonym or equivalent expression: as faithfulness is fidelity.
1. e., the meaning of the word faithfulness and that of fidelity are homon.
The meaning propositions are similar to the one first spoken of: "Bun is the
Game of the orb of day," **Death is the name of the end of life;** "Term is
a name given to each of the names which distinguish the existences com-
pared in a proposition and so on. All of these propositions iff e homon in-
cal, homon is affirmed in each one of them. '

Such propositions as the one above have been called verbal, because the
existences compared in them are words. And according to the old but erro-
neous system of predication, in such propositions, one name is predicated or
affirmed of another. One name, however, can not be affirmed of another,
nor can one existence be affirmed of another; the only thing that can be
affirmed, in such propositions as we are now treating of, is homon. In those
propositions, also, which are called real, in these, which explain the nature of
the thing defined, homon is the thing affirmed; as "A triangle (the thing
signified by the word) is a figure having three sides and three angles," "The
eye is a physical organ by which we see," "A primary property of mahf is
intemetrablelity," and so on.

But in the proposition "John is John," which we considered a little
while ago, we notice that the subject and predicate are aggregate exis-
tences and that each one is compared with the other in the aggregate- as a
totality. Now when the subject is an aggregate existence, and it is viewed as
a totality, and all of its gregaria are taken collectively, the predicate must
also be compared in the aggregate in all homonical propositions: for an
aggregate existence, as a totality, can not be the same as a simple existence,
and vice versa. But there are homonical propositions in which the
subject, in appearance, would seem to be an aggregate existence viewed
as a totality, while the predicate is very plainly a simple existence, a gre-
garium: we must therefore examine such propositions.

We must always keep in view that in every simple proposition, two
existences and only two are compared: in logical propositions these two ex-
istences are immediately compared, and in conclusional propositions the
are medially compared. These two existences may be, each of them, sim-
ple, aggregate, or collective; yet there can but two enter into the comparii in
the proposition of which the result is expressed in words. And one of the
difficulties in the way of understanding propositions, is to ascertain what are
really the two existences and the nature of each of them in the proposition.
This difficulty has not been overcome by any writer upon logic, heretofore,
with "those work we are acquainted.

Now when we say that "Snow is White, or that iron is fusible, we
might believe that snow and iron, aggregate existences, are compared in to-
tality, with their predicates respectively: this however, would be entirely
erroneous. And in order to ascertain and clearly exhibit by the wording of

the proposition, the two things which are really compared, we have to state
the proposition thus: One of the capacial gregaria of iron has fusibility, and
proposition in which a like result is obtained as in the other, and in which
two simple existences, which are the things really compared distinctly appear.
And if the proposition be stated so that the homonical nature of it also ^all
clearly appear, it will read thus: one of the capacial gregaria of iron and fusibility are homon. And in all homonical propositions in which the subject is an aggregate existence and the predicate a simple one, it is only one of the gregaria of the aggregate existence, that is compared. In the proposition, Cataline was ambitious, when the things actually compared are clearly set out it will read One of the capacial gregaria of Cataline was ambition, i.e., one of the capacial gregaria of Cataline and ambition are homon.* When we say Red is red, the result of the comparison is easily seen, because we plainly see that both subject and predicate are simple existences; but when the real subject is covered up by a term which signifies an aggregate existence, and the predicate ia simple, we are misled.

And hence in such propositions as Iron is fusible, writers have said that the predicate is affirmed of the subject, or that the predicate is contained in the subject and so on, all of which expressions iot only give erroneous notions, of the nature of propositions in general, but per se they are utterly false: for the existence which propositionally is called the predicate is compared with the subject and the result of such comparison is what is affirmed in every proposition. And although fusibility is one of the capacial gregaria of iron, and it is contained in this aggregate existence, yet this aggregate existence in totality is not the subject of the proposition Iron is fusible, but this capacial gregarium of iron is the subject. We have already shown that in every proposition two subjective existences, i.e., existences grounded in the ego are compared: and in the proposition Iron is fusible, two fusibilities are subjectively compared, and subjectively they are similia: and then they are objectively located as homon in the aggregate existence iron, and this is the result of the cony)arison in the proposition Iron is fusible.

Now as there are but two classes of subjects, simple and aggregate, «and so also of predicates, it would not benecessary at present to say anything further respecting homonical propositions were there not sometimes set down the words all, every, most, some, the whole of, none, both) etc., aloni; with subjects and predicates : but homonical propositions in which these words are either expressed or understood need a further investigation. And when we say that All iron is fusible, which writers have called a universal proposition, what do we mean by the words All iron? As iron is an aggregate existence, let us first examine a simpler case; take the proposition All red is red, i.e., red and red are homon. Now almost any one will say that this proposition is self-evident, because were the predicate anything

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i GMT f«d, it OAUu Mt <ytdMtlTely hit tiee flaaiie thlBs^as the siHbJect,:^Uich 'ift fed. JTow Utit«xpi«tiifkMoii •»!! easily. Im applied to taravel th^ mysteries ci the pirei'itifm Jul iron is fusible.. For this proposition may be thus «IIMI, Onepf theoapaelial srtpgarinm of aU iron and fusabilili^ are homon.

And from this proposition, it must appear, tliat were fusibility lacking in an jigcrefate etiattaoe, that existence could not be iron. Fusibility is a n^ces-
r|;ri:;ariitm in any aigriBfate existence, which ve distinguish by the , Iroi^; and eoDsequeffbf it must exist in thia piece, that piece, and in <all l^eoes Of aimeite iigtfregat1Ms.

"'She wM*d Alil atandkig before ii^n dees not indicate that the mind jbvsliuinre made what it uMialy called an Eduction, l. e., that the mind from aUttml number of instances has determined the lawa of nature to be uniii^rm, and theiellre thia piece and Uiat pieoe wiU fuse. The discovery of the cas>a-
i^ai:|\"regarhUik,1^ii^Uty, in one single piece of iroo, If by this gplegarium w» distin^1J^ an\"aggregate existence from others, and mark the 4istiootlon
by the word iron, will enable us to say with certainty and truth that iron is fusible; fMrin doing so, we merely state that one of the necessary gregaria of iron is fusible; which we distijj^gdish by the name iron, and fadfbHJty ai homa. That there may be other gregaria in the aggregation, of which as we know nothing does not change the case.

fiap^o0ie ft^MTSon to 8e tato into a large room in which the first were finuf Idndt dr si^s upon dli^ferent shelves around the apartment, and he be required to give dtsUnngilltheiai, names, which would enable him to speak afterwards about the balls, respecting merely their taste; and colors. He would lave' up the first one at hand, and perceive that it was of a red color and that the w^M•M taste, and therefore he would name this ball A. Then every ball in the room that was red and sweetly balls of colors and tastes which are inter-se similia, temtii^t be diff^ntiated, must be called A from men* mi flIcecaseity. Attd by the name A, they are afterwards distinguished from those that are blue and sour, which might be called B, and from those which ai^ iridite^ffid bitter, which might be called C, and so on. But, so soon as he tedfiveifheiaiaie A to distinguish the first ball of a red color and fcre^t taitae-Adm olhets, j^ llalls of a red color and sweet taste mxmt b^ called A, $Ma it so, $fionid he not immaediately jr nging the first Jmll. hate iBiM.11^ pferfbet oefi^nty laad truth th't all A ia red anil i^l A is sweet ? Aad if afterwardt, i^shed ball M«wilb be found that was sour, it would^ot be «l A; but ititDtttt be called 1^ some otiiermeno*

V. B«JL(n IMian, before tlie dtacoreay of America, might have said that |HM8M8niedfordforlehad never send^y man of adifferenit color, yet ^Is igftf1dnot wotM not l't^t been true. The apiedenta also^ might have said and d^aaav thirty 1^ amns are wihtf^ yet «uch i» not the case. AM therrcrro in isK Ibeatf «aseli lie in taking the gregarium of a particular object or objecu

and makiog: this greg^um in our mind, one of the ae!)c^sie»H*y'gr6garift(o dit^ tinguish this object from others, when it is ifbt lae: there were' other Uiiiftgi ' red besides Indians, and other things white besides swan's, Wlgrzeli aaHnto were distinrsh^ by <i Ames: the 'color was^ not«nd^of the gregail« bf which these objects were lieecessarily distinguished.

# Bat we have said that aggregate existences ar^ dfsting^sfaed inter se by the facia] and capaelal gregaria eo^zisttot^. And hence did one i^GM* gate existence contain similar facial but not similar capaelal gregaria wUh • another, the two aggregations would pot be similia, and 'ecouM Bot be ittt*- tellighthly distinguished by the same name. A distinguishing ntfiie'' is & word taken at pleasure to distinguish existenc()s inter «e; and when ft BUtuds fdr an aggregation, any one of the)^egaria sine qua non^cannot beitei^fi, and'the aggregation becalmed by the sftme bi^ne Us an*object H w^icll^it bxists. 'Charcoal and the diamond are said to be, as elements, «imilia, yet Uut gregaria differ and consequently We can not speak t>f each intelligently «ttd 'use tlie rtme fiame. i'- ' " n . n

But how then, say you, is it that a black swan and a white Det mity both be called swans? SiVnply beciluse they are dfllbreBtiated iBto swaa'a irrespective of their colors, just as wfd. and white, as we ^aaftve 8een,nBre ffifot differenitated into color, aBdi4hen distinguished inter %e, by the name»«^ iM aM white. Alb men are mortal, is a proposition of the same kibd.as All iron is fusible. Mortality is due of the capaelal gircgaria sine ((idiilon of-* mMtf, and a Hving being not* subject t^eath would not be a man. The prop^- tion. All men are mortal, howevev^is a very (fffferent one fh>m^ Ali-Bieii are
Mortals; the first affirms of mortality and iDue df the Gapaxia (spngh-
garion sine qua non of man; the second affirms mbn4aid one of the of the aggi^gate
existences called mortals to be homon. All^xien are aaiitfals, and, All sheep
are animals, are ^milar pjfpositions.and tiley may he thus' interpreted: man
and one species of animals are homon^ sh’eep and "oike speoieftiof animals ate
homon.' *

But to pursue further the effect of the word ali* in prdp<8ifto88,^if
when man was first placed upont; the earth, he had HyM to 4he age of ten
thousand years without a death occurring^ and if ^during that^riod lie Ittd
invented languages^ in^All which distinguished hiUMMlf by the name man, it is plaiji
that mortaliij^ Wuld not ^ave been in his” mind one of"it ^ capaeM gie^
gariaof himself: he wotild not «t least have known this by direct obseranfe-
tipn. And if during this time, so constIMtonal -changes 'among^ exjteraA1
objects had come to his knowledge, it is evident tfaat^e would have; known
nothing at all about the capaeial gregaria of objects; but all the naones In
his latiguage would've been signs to distingtiisb simplenexiiifeeo<<eliiBtrae,
and aggregations of f^cifld 'gregaria. Atid therefore lall ttoe iiigg^gat« tis-
lences now clasaiifled by their capaeial grfegarla and marked by dMcfguish-

lngxMa<eji ^yl\nlnd iiaye l^efiuimed tmclliifsifi^* And tUiea each en^ of ^The
km\m gr^gmria, wliicli^was a sa* qua boq of aoy class, wcoild havebeeo a
aeesfIifty ia order that any object might have been called by the name tx:
: ia^vi^Qais (^ the cliss. "ames" (4 Qottrtttt, nailer the circumstances
wmM hare been few in iffimer. Bat snppose now, that at the end of the
piviod aho"TO i^ken of, one of th^ human species had died, here wonjd have
Meat' to isAbkind a new truth learned by obaeryation. Aud were this instance
off death Uwn madc^Snrown to i^ the living, all subsequent deaths would not
imRe been new truths^ lml other instances p| simUar truths. And. although
BOftdrimUe est |^em or son sioUf ia •unt. idem, objectively, yet subjulctivly
simili& are the siune Hijng if li];ae.be left out. of the question. And hence
Tia|Wirrtgt^gt^e knowledge of truths in the^ind, the repurrence of similla are
vecMde^ and often spoken ot ^s other, instaaces of t^e same truth, althoiUgh
they are not human but siiiAlia; their times are hetera and therefore, the truths
tm aimUia, but w^iTe their Umes homon, Ahe truths also, would bejsubjectively
hmmon. "ov if we haare gainedthe knowledge of one individual of sim1uAa,
"m base gata<\l &li the"'uwledge wQ"will e"er have of the similia, except-
i^ 1hc|rimbrer or instances. A,xnd..tiierenere after one death had oQquired,
"A quesitioa wuld have been, mending simnula iu those gregaria which tp-
St^Ousr make th^ object 41Min4;iXi8hed l^jthe ns^e man, is death ^ne Qf these
eapacial gregwrlaT. That it is^ouuld have been proved tp men under
the"atipirrcircuAstaiae"s only, by a proce89 of^ reasoning whiph we^ball develop
]Mf«xfft. {See book 1, chapU x^10 But ae. soon as it is^established to, be
tuiiv it ia asine qua non of man and he^ce we^si^ that deat/h and one of the
eapaciip^jregarla o1 td1 -men are homon. An^ as aggregate existences are
eetptopoaeidjof certain facial and ci^clal aregarla, which are the very things
n^iolidistinguisrl.them into classes of cmnilia, whep any one of these greg-
Jaria sine qua non is known and given a name, it may be made the predicate
of an homonisil proposition, in which the word all names the sum tutom of the
aggregate 'existence for any one of Which ^the noun placed after all
stands as the name. And h^oe that all iron is fusible, when fusibility is once
in our D\d s i ^lue qua npn of iron, is a necessity of our minds. It may be said t)
|at fik»libility is not a gregarium.sine qua non to distinguish iron from other
th^n\i;«; O>r jgold and other metals po^ess it. This is true ; but go one step
bmk ulto, the class of things called. by the name metal, and We will find fus-
hitMfio*e"QQe ot the distinguishing gregaria, and in subclassifications this
.fregi^iuO|rS|iUstpd^ into each of the subclassses; for they, each of them,
uadfMr i«iame etal possessed it. And hence, by adding the words all
«SA WWIT to Uie name of an aggregate existenge and then |;pakin|; the tfRM
, t|Hl si|}« Evo|YJ9 one of . an hponomal proposition with, a simple. existence as
the predicate, we show this simple existence named in the predicate to be one
of tJ^egaria su|e qua non of the aggregate existence named in the subject.

All gol4 is proof ftgain^t the tffeet of iiitrSc ^dd, i. e., 4>nfr of tte^q^A0ial
gtgaria sine qua noii of g#ld) and proc^ again^ tiw^ffild of nitroacifi atf»
homoD.

But we must nam exuailio t^e Ijuaoitia of Ikeword ioicsirtioifptocod
befire the nattie of an aggregate ^xistenee in a pvogpositien* Take tMiMeopo^sition Borne ink is r^, i. e., one of the faoial gregeria of sonii ink aisl bbp
are homon. Now it* mast appear that the iiaaal gregff Ivptt here amationed is
not a sine qua don of ink, but that it is one Whii"e"eom"ared with <iofrl>ither
color, enables us to diff(>ventiate inks. 6o1gb th«efi)ire, as it nones the part
of a whole, shows also"by being plactd belbre ^Mi aggr"e exJitea cea
homonleal propositions, that the gregarium, which ti^g/pean aa^simipli «d»
teeue in'thei)redicate, is not .a sine qua noa of ttle class ec* aggr"pble mde-
f"nees distinguished by the name which appeuv In Uie subject anicl Mmed
by the noun after 80MB. *

We da not deem it necessary' to pufsysr the siibfeczfi of ibomonkad
propositions farther at present. If the i"eaider will careftrlly study wJwtrJMM
been said already, we ihink he will be able to follow and ioiideesfeHid' the
arguments, which we will advance hereAHer. We will, hwhVCf; set down
sevOTal homonicid propositions in^HKO language that is tised ta comttun^ dis-
coi"se, and"the reader can change the phraseolog)"", <o as if> make tie tinit
affirmed appear plainly to be homon: 'Someeaa arebladk<^"yed; iLU fowb
lay e;gs ^ All gold is maleable ; God is love ; An i^ple is an apple; ▲ ttirai|^
line is the shortest distance betuM"en two plants in spabe^ Ice is firozen water;
Sohuyl^kil is the name of a rITOr in PoDnsylvania; Wariiingtoii dlsd at
Mount Vernon ; We are living- in thenineteenth century of the GhrisUan #»;
Columbus discovered America A. p.' U"e Sh"ike"ieare was a <kamatlc
author; Sophocles wrote ."EdepusTyrftmius; N>iWtoodiscd98redlk»unixtr^sal law of gravitMion. '

OBAPTEPXL 4

Having treated of hom'onical propositions, we h<i", iVHh par"al suc-
cess, we come now to speak of the second class, whkf^ e have cied hetar-
cal propositions. And heteretical propositions affirm results, which are
directly, the opposite of those affirmed by homonial ones, and eonsequeMfy
the two classes are diffierentiit;^; and when a prot>osition of the one class U
spoken with reference* to the other, it denies the affirmation ttad^ by die
other. If any person affirm that A Is B, i. e., that A and B ai^ hmon)\n^aid
another p^son reply that A is net B, i. e., that A and be are hetera,"elatitf
ihakes and aiffirmation contradictory oi the affirmation c^ the foritier and
vice Versa. ' ' " Digitized by ^OOQ It '-^
But the two pieces being inter se similia, if you hand one of them to a per-
son, and then take it again and put the two toegether, and ask the person which
one he had in 'his hand, he can not tell. How theu does any one know that
this piece is not that one, i.e., that the two pieces are not homon, but hetera?
Simply because the wheres of the two pieces at the same time can be heterated.
But is not th« proposition, This piece is not that one, an independent propo-
sition, i.e., a proposition expressed without reference to any other? If it is
such, then it can not contain a denial or negation of the subject, as it is
generally supposed, but it positively affirms this piece and that piece to be
hetera. You can not numerically count pieces of money without heterating
them, and you can not express in words the heteration of them without using
an heterical, X'roposition or propositions. What is the diflierence between
These two pieces are separate existences, and This piece is not that one; leav-
ing the wording out of the cdnsideration? The difference is this, the former
proposition never could have been put into words at all, without the latter
one having first been menially at least enuntiated: the latter proposition
mast preceed the former in the mind, or a knowledge of the tormer never
could be gained: in efiect, however, the two are alike., The former proposi-
vion may be resolved into This piece is an existence and that piece is an exis-
tence and the whole expression is exquivalent to This piece is not that piece
i.e., this piece and that piece are hetera. And every heterical proposition may,
in effect, be exactly expressed by the use of two homonical ones, by placing
the distinguishing names of helera, this and that, before their subjects: two
homonical propositions may also be condensed int© One similical or com-
mensural one; or they may be differentiated or incommensurated, in differ-
tial or incommensural propositions, as we shall sec hereafter. But there
must be an heteration of existences in the mind before any proposition what-
ever can be expressed; for we have already shewn that the process of heter-
atation lies at the very foundation of knowledge. And this process of hetera-
tion can not be a negative process; it must be positive or it would amount to
nothing, and its positive character can not be expressed but by an affirma-
tion. This has been overlooked, heretofore, by all writers upon logic. Be-
because the particle not is found in the proposition, it has been universally
believed that the predicate denied something of the subject, or that the predi-
cate was denied of the subject; a proposition, which follows legimatel'y-
'enough from an other, which is that when this particle is omitted, something
is affirmed of the subject, but both of these suppositions are untrue. The
predicate is no more affirmed or denied of the subject in' propositions than
the subject is of the predicate; the two existences are compared, the one
with the other, and that which is affirmed, in all cases, is the result of the
comparison. It is impossible for the human mind to affirm or deny one

existancc of another; all that we can do is to affirm some relation existiogf
between existences.

One and the same existence of the non-ego can not sustain heterical,
similaral or differential relation to the ego in an homonical time; for it it
could, we could have no knowledge of identity. When we lay, therefore,
that A is not B, we do not mean that A does not exist, or that B does not
exist, for both must have an existence grounded in the ego at least, or we
could not put their separate names down on paper; but, by A is not B, we
mean that A and B exist heterically, that A and B are hetera. The particle
NOT, therefore, in propositions, stands as the sign of heteration made by the
mind, but the result of tile heteration is positive, and it is affirmed in all
propositions containing this particle. And we lay down this rule: That
whenever the wheres of existences grounded in the non-ego can be heterated
in an homonical time, and whenever the times of existences grounded in the ego can be heterated, the heterical relations of these existences are expressed in heterical propositions.

In homonical propositions we saw that the wheres of the two existences compared, could not at the same time be heterated. When we say, John is John, he subject and predicate subjectively have the same where, but not an homonical time: John and John objectively have the same whereat the same time, and therefore, objectively they are homen. But the objective John and the subjective John are hetera because their wheres at the same time can be heterated; and John and John are subjectively hetera because, though their wheres are homon, they can not have an homonical time. And, therefore, homonical and heterical propositions contradict each other, when their subjects are similia in every respect, and their predicates similia leaving the particle not out of the consideration.

Now in heterical propositions, we make no account of the similarity or dissimilarity of existences; all we care about, is to be able to heterate the wheres of existences grounded in the non-ego at any given time, and the times of existences grounded in the ego, and then we affirm hetera. And hence if we place two white marbles before us, the color of the one and that of the other being perfectly similia, yet we say that the color of the one is not that of the other, i. e., the color of the one and that of the other are hetera; for the wheres of these colors can be heterated. When, however, we look at a (one) marble and say The color of this marble is white, or to use the short expression. This marble is white; the color of the marble and white subjectively have the same where, but heterical times; but when we project those subjectively heterical colors which are inter se similia, into the objective marble, they both have the same where at the same time and therefore, we affirm homon. 

Now we have, heretofore, divided subjects and predicates into two classes, simple and agregtgate. And of simple existences, some become the gregaria of aggregations, others do not. Time and space are never gregaria. And we most have observed that it is the relations of simple existences or of aggregation* in time and space, that enable us to affirm homon or hetera; the power of the mind to heterate depends upon time and space. When we say that this apple is not that one, we apparently compar one apple with the other immediately: the existences, however, which are immediately compared, are the wheres of the one and the other at the same time. But when we say subjectively. An onion is not a peach, this proposition is more than heterical and it belongs to the differential class, which we will treat of liereafler. If, however, we say this peach is not that onion, we heterate the wheres and affirm hetera, and this is shown by the words this and that. And if the reader will'bear in mind, that whenever he can heterate the wheres of existences at the same time, or subjectively heterate the times of subjective existences, the proposition may be heterical, we think he will be able to detect heterical propositions, whenever he may find them in books or conversation, by some words which distinguish hetera.

We will set down a few heterical propositions for practice: Philadelph is not New York; The Pacific Ocean is not the Atlantic; My hat does not lie on the floor; The birth-place of Washington was not Boston; This Land is not that one.
CHAPTER XII.

BIMILICAL PROPOSITIONS.

When treating of homonical propositions, we showed that absolute identity makes no part of our knowledge; that in all homonical propositions, the existences compared are always subjectively hetera; that heterical results in the order of time always precede our knowledge of identity, and are the very first results obtained; that the knowledge of the existence of any simple existence is dependent upon hetera; and that unless heterical results can be obtained, chaos reigns supreme. If I see a horse to-day and to-morrow see the same horse again, nevertheless, subjectively, I have seen two distinct horses; and when viewed as existences grounded in the ego, I distinguish them by haterating their times, but when projected onto the ground of the non-ego, the hateration of their times does not distinguish them and as I can not haterate their wheres at the same time, I can not distinguish them at all, but pronounce them to be homon.

But suppose that subjectively I consider heterical existences and can not further discriminate them, and objectively also I haterate the existences but can distinguish them no further, then we call the existences similia. And hence when we can haterate subjective existences, but can proceed no further, the existences are subjectively similia, and when we can haterate objecti^64

existences but can distinguish them'no further, the'existences are objectively similia. And, therefore, objective homon is always subjective similia, but not always vice versa; for subjective similia may also be objective similia. Subjective homon can not be expressed in a proposition, i. e., two acts, feelings or states of mind can not be one and the same, they must be hetera, and one thing per se can not be compared.

Take the proposition This orange tastes like that one, i. e., tite 'tastes of this one and of that one are similia. Now the sensations of the taste of the one and of the other, as existences grounded in the ego, are similia, and when projected onto the ground of the non-ego, each one is a gregarium of heterical objects whose wheres can be haterated, and therefore, objectivelyjtle tastes are similia. We need not proceed further at present with similical propositions. We will subjoin a few examples for practice: This apple tastes like that one; John is like his father; Time is like a silent river.

CHAPTER XIII.

DIFFERENTIAL PROPOSITIONS.

We proceed now to the consideration of the fourth class of propositions, namely, differential propositions. And when two subjective existences can be discriminated by anything besides their times, the existences are subjectively differentia. The effect produced upon and within the mind by red is different in kind from the effect produced by green, and hence the two effects are not only hetera subjectively, but also differentia. And existences, which are subjectively differentia, must necessarily, if each have a corresponding objective existence, be also objectively differentia. But hove or why It is that the mind is able to discriminate between red and green, subjectively, we do not sufficiently understand. The two objects, which produce severally these different effects upon our minds. Sustain in some manner different re-
lation to the ego: they are other different elementary principles, or the one is composed of more or differently arranged gregaria than the other. Let this be as it may, for logical purposes it makes no difference to us; every person will distinguish subjectively and objectively red from green, and consider them to be things differing in kind — differentia.

We have already stated that subjects and predicates of propositions are either simple or aggregate existences. And when both subject and predicate are simple existences, the differentiation clearly appears. That red is not green; will easily be seen to be a differential proposition. The sign ND T does not indeed of itself indicate whether the existences have been differentiated or merely heterated. But heteration can easily be distinguished from differentiation, if we look at the terms of the proposition. In the heterical proposition, This red is not that green; we see that the terms are particular names, the names of individual existences, and that the distinguishing heteri-

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beterrcal names, this and that are joined with the common names, kbd aai eKEN, and thus making red and green the names of particular individuals: "While in the differential proposition Red is not green, red and green are unlimited common names. The name red stands for this red, that red and for any red, and so also with green; but when we say this red, or this or that green we mean an i^dividual. And hence in heteri^al propositions, the terms are individual names, whhU in differential proposition!<, they are oHmiteci cotnracn numet. And we- may assert with truth that all red is not orkbn: thon^ this preposition, fVom the custom of our way of st>eking, seems to imply that some red is green, and to avoid the effectis of language non our minds it is usnai and better to^ sny that KO red is green. We are aocuistomed tasay with trnth that all men are not black, i. e., of one of thegregaria sineq-na non of man is not black, i. e., Mack and each of tl>e gregarheine qua noi of man are differentia, and therefore, by implicatio wo allirm that some men sre, or may, 1we black. An4 hence the custom of language, when we say that all red is not green, woukl lead us to inter tha4; we meant, some red is gretsn^ i. e., that some red and green are homon* in every f ropositioto, therefore, in which the particle not occurs, and the subject and predicate are simple exist- tnces, if the terms at* unlimited common nomes, theproi^oftid^n isdi^ren- tial, it they are particular names the proposition is heterical; as John is Hot Otiarles. And this is also the case when both the subject and predicate are aggregate existences, as a man Is not a horse, Is a difi^rential ^roposition ; TiiTi s man Is not that dog, heterial. When, however, the subject is an aggre- gffate existence and the predicate a simple one. Some further explanation seems necessary. Take the proposition sn<iw is not IMaek. This i^oposition may be thus-stated: Each gre^ariuin of smnv and black are d^fcreotia. No snow is blhck means the seme thing, and guarding against the custom of language, we may say that all snow Is not black; l>etter-*^No snow is black. AH these proposition^ m^an the samt; thing. All snow is white means that one of the gregaria sine qua non of swaw aad whitr are homon; but nn snow is black, meanfc that each gregarium of snow tfnd black are differentia. And lience in all propositions no is always thesigno*" differentiation.

None Is equivalent to no one, of which words it is compounded; and when we say that none of the horses are gray we mean that no one of tka horses is gray, i. e., gray and the color of any ^ineot the horses are differentia. Ko one ot The horses i* gray, however. Is a very different proposition in its terms than ico horse is gray, i. e., each gregarium of any horse and gray are (llffmMitia.
We here subjoin a few examples for practice: A river is not an ocean; an Indian is not a negro; an apple is not a peach; no fish is a bird; a gosling is not a chicken; gunpowder is not saltpeter; steam is not water; none of the pupils are learned; a true christian is not vicious; cotton is not wool; iron is not explosive; day is not night; cause is not effect; no horde is a stone; the rainbow is not a cloud; no color is a sound; the rocks are not trees. 

CHAPTER XIV.

COMMENSURAL PROPOSITIONS

Having treated of the first four classes of propositions, we may now consider commensural propositions. It must be evident to any one that if we take two simple existences which are inter se differentia, white and green for instance, we can not truthfully say that they are in any respect related to each other except as colors; indirectly, as colors, they are similia, but directly, they are inter se differentia. Between two such existences, therefore, no comparison can be made unless one result, other than a mere rational or differential, can be attained. They are not similia and therefore we can not by their comparison obtain a similliaal result; nor, from their comparison can we obtain homon. After having obtained therefore, the results, homon, like-a, simila and differentia, in order to obtain propositions, which will render results different from those just mentioned, we must measure later se results aUfedy obtained. But homon can not be measured, for it is an identical thing, and a thing to be measured must be measured by some other thing. But hetera, as hetera, can not be measured, for in measurement there must be Home coincidence and not mere separation, and differentia, as differentia can not be measured, A(r) they can have nothing in common which is measurable.

But similia, therefore, are the only results, which, admit of comparative measurement. We can say that this red is as red as that red, i.e., this red and red are commensural; and if we compare one stick with another we may say that this stick is as long as that one, i.e., the lengths of the two sticks are commensural, and thus we can compare many of the similia of nature and obtain commensural results. We do not deem it necessary to enlarge upon the subject of commensural propositions, as we concluded that they will be easily understood; and, they will also be illustrated along with the others hereafter. We must observe, however, that homon is at the bottom of them. When we say this red is as red as that red, tile as iucd and AT red are homon, and by stating two homonai propositions with the word AS between them, we will readily see, hoiv two homonical propositions merge into one commensurai one; Thus, this red is red, as, that red is red. In the first proposition, the subject and predicate are objecliously homon, and so also with the second proposition, and the word as allows that the two are commensural. We will subjoin a few examples for practice: The day when as dark as night; this candle shines as bright as that one; she looks as fresh as the rose; it just as sweet as honey. 
we come now to the consider of the propositions, the class of logical propositions, and in incommensurul propositions, til the candle shiies brighter than one, that there are more excesses or brilliances by then mean of the more brightness which exists in the brighter candle. The two are not differentia, as white and blue are not the same things. There are, however, three ways of expressing the excess in words, viz., A is larger than B, B is less than A, and B is not as large, or not as large as A.

Now we say that snow is while, one of the racial gregarim of snow and white are homon, we locate the gregarium, which is a subset of the snow, and consequently the excess would be expressed by the adjective name, and adding to or in the subject. This excess is also expressed in the subject. It is connected to the subject, and the predicate of the incommensurul proposition, and the subject not shows that the degrees in the subject and those in the homonim predicate are incommensurul. In the commensurul proposition, the degrees in the predicate and the subject are commensurul, but if we insert not we will have this red is not as red as that red, and the last two reds are homon, and their degrees and those of the subject are incommensurul.

In the predicate, and the subject are commensurul, but if we insert not we will have this red is not as red as that red, The last two reds are homon, and their degrees and those of the subject are incommensurul, the difference or excess being that the predicate.

Kow when the subject is an aggregate eiipienoe ft$d it is compared
apparent] J with iin Aggregate exUteace io the predicate, in cmsmeiiaarfu «id
ittcommeiaoral propositioos] H ia always one of the gregm-ia of each that is
omii pared, and these grevanacompared Are always aimHia in kimifbit coin tneo.
sural or incommenaural indeelcre. Intbeppopoation snow ia whiter than chMik
tile facial fpegariam, white exists in eadi of the agigrate existenees, Yut The
degrees oC write in the one and in the other are compared and fr>und te be tn-
coQMrnetistiri. And when we say alt snow is whiter thfin chaile, it is one of lliie
greg%riashieqtm hm) of snow that enters into lliie idoowmenaufAl propenrition.
And if we could say in trath tIMt ah snow is whiter than all or any chelk,
the degrees ne plus ultra of chalk would be cxe>mpared.

Before passing on to the next chapter, we must examine sndi proposi-
tions as; John is the strongest man in the house. This proposition at first
sight would appear to belfitt<( to a seventh class of propositions, bntron exami-
nation, it will (M foutKl to he merely an foononal proposition ooUtented into'
a copclnelon from several incommensoral (Hies, and it may be thns stated, ihe
strongest man ameg the n^n in lliie hfonaee and John are homon^ And aa
also, Sampeen wae tlie strangest man m( whom we inive read, is an homonleal
propoosition. ipereulcs was stronger man Samps<m, iaan ineon^menereur] pro.
)}>osition. And sill roopooetions, in which Ifere are. euperhitireaamee, are
homonleal. We nvelhe following examples 4'«>r practice: Wint^r Is colder
than summer; th^ elephant is moi« intelligent than theaes»; dogs are more
fhiuhfj1] than cats; cows are more useful than rabbits; ihe bite of a rattlle-
snake is mote dangeroue to man than ti>eetingof ibe wasp; Honey issweeter
tilansHgart the mAe of 4lie nighlen^ale is inare.pleattaaliiluuin that of iba
crow: 3&f.y^x.

ClfAn'EH XVI.
PUOrOSITlONS PnOMW'C'IMII.SI.Y^

Having gone through with tiu^ six classes of proposition's, we should
next in order consider their subdivisions Into categorical and hypothetical;
we do not deem it necessary, however, to do more than mt^nto lo' the^esulnlivi.
sions. Kvery one will see for himself that any proik»itio de of either of the
forejfoing classes may be stated categoricall, i. e., the result be affirmed as
Mctu'allly exidtins:. or a result may t)je supposed to'ex'st for the sake oT argu-
ment. We will therefoiv. now give some further attention lo^HM terms and
copula of pro|>o8li»)ns of all ihe f<r>rgoiug classes. ^^^^ ^ o

And looki^ back to ihr nminal iruhs gvoundid in the non-ego, nf

which we spoke at the begiDnin^ of our iurcsti<;<atloQS, aad supposing tiu»t
all objects had had the same color, co aid we have called this notnioal
truth A (one) color? We have already shown that the unit Ida oumerical re*
lation and that our knowled<e ot ills envoi v«d from dualitj. or plurality.
And in the five nominal truths mentioned, we have hetera^ from which (he
knowled^jje of first, second, thikd «fccc., might have been evolved. But
we have also shown that when numbers, the names of Uie individuals of
lietera, or of commensural colligations of hetera, are applied to existences,
and the name to distinguish individuals otherwise than heterioally, is spoken
or written after t"em, the name so spoken or written must be the name <kf
simillia, a cogimon name. We may have a horse and a dog and the two arc
existences. But ExisrENO8 is not a name given to distiugnish existences
inter se, and should we write any name, which does distinguish existences
inter se after the word two, we will find that two will not apply unless the
existences be inter ss similia. Horse and dog are difi'erenlia) and their names distinguish them; neither of these names, therefore, can be written after two so as to express to us the numerical sum of a horse and a dog; as lietera existcffces, two may be applied to them, but not as differencia. And respecting the nominal truths, as the are inter sa differentia, two could not be joined with any name, which distinguishes them as nominal (ruths. But if one be the name of a numerical relation, as wo have shown when it is applied to a differential name, there must be more than one thing distinguished in like manner by the same name; there must be simi4ta; otherwise the thing distinguished by such name could have no numerioad re- lations to other things, except as hetera, which in lan^uage cU>B0t receive differ, ential^names, which afterwards become the common names of sUniiia. And therefore, when we say, An existence, by this expression we show that we have in our mind one of several or many existences, i. e., one of lietera^ and \when we say a dog, the expression shows that we mention one of similia^ Looking then at the nominal truth, color, could we say tluU, this is jl (one) color? We think not. We could say this is color, or this Is an exis- tence, and that is sound ; but a color, as a name, not only distinguiscis color from sound, taste, &c., but it also points out some one of similia, as colors. And hence a or an before a name, in homonical proposiliona, makes them quasi similical ; as this town is a Philadelphia, l. e., ihia town and one of the Philadelphias are homon, and in effect, this town and Philadelphia are 'simi- lia. The proposition This town is Philadelphia; is an hottonioal proposition but the placing of A before the predicate makes the proposition tttough lio- nitional still, quasi similical, there being but one Philadelphia in our mind, and THIS TOWN not being that one. *.^.^.*^-^ by ^OL And all names excepting proper names, used as terms of propositions point out among other things, a numerical relation inter similia. In the

TO

hoHMHiiCii) proposition, J»)liu is Jolui ; i.either of the terms point out a du-
mt^ricili relatioD; but lu the homonicul proposition J iho is a man; i. e., Joliu ami ft (one) man are bomon, tile predicate term points out a numerical rela-
tion, and as it stands tor the same object as Jolin, when John is brought among the similia of which it is one, among tiiese objt^cts, John lias a numerical relation, he is a man, one of the similia named man.

Now bringing before us- again the name color, if there existed a red and A green, we would then have I wo colors and we could say that red is a c<Hi)r and also that green is a color; but upon the principle just exhibited ab««ve were there but one red object and one green object ii:~ existence, red and green would be proper names and we coi Id not say, this is Aj*ed, or that is A green, though we couJd say this is a red color and that is a green color. i^ut in the homonional proposition Ked i^ a color; ued is brought from pri-
mary propoetional truths into nominal truths, and among nominal truths, it is one of the similia, a color, i. e., rep and a (bole) color are homon. But if RED be A ci»lor, hov»- can we fully distinguish in every respect this existence from others by words, when ah have it in our minds, otherwise than by cal-ling it a red color? And hence we see that every term of a proposition, which is made up of moi-e than one name of simple existences, points out the reMuhs of several relatifims, and the numerical relation among similia pointed out by the term, is called the extension of the term.
Passing on now to the consideration of terms, which are the names of aggregate existences, take the proposition, Snow is white; i.e., a gregariuni of snow and a white color are homon, and we see that white is brought into and specified among other gregaria in snow by an homonirical proposition. Again, Snow if* cold, Snow will melt, <etc., are all homonirical propositions, and the predicates of all these propositions are located, lasciculated in snow. We may say While is in snow; i.e., the where of a white and that of snow are homon. Cold is in snow, The simple gregarium of melting is; i.e., a fasciculus of certain gregaria and snow are homon. And if by homonirical propositions we fasciculate simple existences in an aggregate one, can we not in like manner bring together aggregate existences? When we say, The audience was intelligent, we have done so. John is intelligent, William is intelligent, Mary is intelligent, <etc.; but John was one of the audience, William was one, &c.

And when a name, as the term of a proposition, stands for an aggregate existence, the gregaria taken together in fasciculo constitute what is called the comprehension of the term. And in the differential proposition, Stone is not iron, the comprehensions of the terms, stone and iron, i.e., the gregaria of the one and those of the other, are compared in fasciculo. Some of the gregaria of the one and name of the other may be similia, but if the one comprehend certain gregaria and the other certain gregaria, which

are inter se differentia, or if the one contain gregaria over and above the sum of the gregaria contained in the other, the two fasciculi are inter se differentia, and they are differentia throughout the whole extent of the similia of the one and of the other. Stone is not iron is equivalent to, All stone is not iron; better, No stone is iron; and this proposition is equivalent to, No iron is stone. And hence when fasciculi of gregaria comprehended by the subject and predicate terms, are compared, the proposition may always be converted, i.e., the subject be made the predicate and the predicate the subject. This is also the case when simple existences are compared. Red is red, homonirical; This is not that, That is not this, heterical; Red is not green, Green is not red, differential; This is like that. That is like this, similical; This red is as red as that. That red is as red as this, commensural; and That red is not so red as that. That red is redder than this, incommensural. But if in one term is the name of an aggregate existence and the other the name of a simple existence, it is always one of the gregaria of the aggregation that is compared with the simple existence pointed out by the other term, as we have already seen: Snow is white, means that the color of snow is white which may also be converted into White is the color of snow. John is a man, may be converted into One man is John. And hence in order to ascertain the existences, which are real, compared in any proposition, construct one of the terms, if necessary, so that the terms may then be transposed. Ami give the same result as before. This may be none in all propositions.

Now prepositions as we have heretofore said, are names of relations in space among existences: thus when we say Snow is white, we mean the color of snow is white, and snow being the name of a fasciculus gregaria, OP shows that color is located as one among the gregaria in fasciculus distinguished by the word snow: it, that is the preposition OP, is the name given to the relation of color among the other gregaria in space. And hence ih"e i:i no difference of affirmation between Snow is white, and The snow u|>02i
hemountain is white; the affirmations are similia. But in the latter proposition One of the gregaria of snow upon the mountain is white; lo the subject we have a numerical relation (one) existing among simple existences (gregaria) located in an homonical where (in snow) and named snow, which WHERE is objectively homonical with another where indicated by Upon the mountain. But a (one) is not the existence compared with white; the name WHITE is differentia; one distinguishes hetera and points out the relation among similia, while the proposition is homonical; neither is any where compared with white, for where and white are differentia, while the proposition is homonical; snow is not compared with white, but the color of snow; nor is the mountain compared with white; there is nothing, theref(Me» in either of the foregoing propositions compared with white besides a color. All the words, therefore One of the gregaria of the snow upon the mountain;

taken togethor, constitute but one name to distinguish one simple existence in every respect from otliei-s, and whicli simple existence we compare with WHITE and pronounce them to be objectively homon.

If a, b, e, d and e be the simple existences, the gregaria of an aggre-gale existence, and A be the name of the fasciculat'id gregaria, we may then say according to the custom of langua."e that A is a, A is b, etc. And if we wish to locate A in a some wileke, which sball be distinguished from other WHERES by words we may say; A upon the table is a. And if tie where is not yet sufficiently distinguished, and we may say, A upon the table in the house; and still further, A upon the table in the house of John Stiles on Iron street between Walnut and Chestnut streets in the city of Philadelphia is A. But again, take the proposition, John’s book is on the table; and we see that the subject of this proposition is a fasciculation of the subject and predicate of the proposition, This book is the property of John. We do not consider it necessary to explain the terms of propositions further: but the copula is yet to be examined.

Now in the propositions, I am; I exist, or I am an existence; we must see that the affirmation is made in the present tense, grammatically. And in the proposition, I was, Did exist, or Was an existence; the affirmation, is also atade at the present time, but the time of existence spoken of, is the past. I was an existence; may be rendered. The time of my existence of which I speak, and past time are homon. Columb is discovered America, A. J. 1402; may be rendered The time of the discovery of America by Ck)lum-bu and A. D 1493 ar« homon, etc. And whatever may be the tense of the varD, the existences are always compared and the affirmation made at the presenBt time. But respecting what is called the potential mode by grammarians, as John may be a scholar; the verb itself implies japacial gregaria; the capacifl gregaria of John and those of a scholar.ue similia; and in the pro)osilion, John might have been a scholar; the capacial gregaria are re-fered to as having existed in past time.

Now in all propositions, we say that the copula is, means fa'tsts But take the proposilic5n, Nothing is nothing; and if ts means exists, what is it that does exist, for nothing can not be an existence? But we say that it la the relation between the subject and predicate that exists. But still it will be asked the relaticm of what, when we say Nothing is nothing? And in order to understand this, it is necessar)^ to consider how we came by the name no-thing. Take the proposition Tiils is nothing, i. e.. This thing and no-thing are homon. Now if the subject Tiirs thing, means some THiNO'and the predicate xorthing, means nothing, how can the two be homon ?^ If we con-" ceive of a witch, an old hag of a woman, with a beard, riding a broomstick,
suijectively this is some thing, but obj( ciively it is nothing, and therefore.

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we can saj with truth that this some thing grounded in the ego, is upon the
ground of the non-ego nothing; this is nothing.

**Rom. — ^**Peace, peace, Mercutio, peace; Thou talketh of nothing."

**Maro. — ^True, I talk of dreams, which are the children of an idle
brain, begot of nothing but rain fantasy.**

Kow had man gained the knowledge of only two objective existences
and had he called the one a, not a would have been a name sufficient to dis-
tinguish the other, and he then could hare said pointing to a, This is a, and
pointing to the other, This is not a; for if it be not a, it must be the XHer ex-
istence. Both these propositions then would be homonical viz : This is a,
this and a are homon; This is not a, this and not a are hemon. But if he
wished to show a, and not a to be dilterentia, or to affirm hetera in a proposi-
tion, he would have to say, a is not not a, i. e., a and not a are hetera, or a and
not a are differentia. But if there were four or five existences known to man
and he should distinguish one of them by ttitle name a, and then pointing to
another he should sa3% this is not a; not a, would not distinguish any one of
the remaining four from the others, aD<1 consequently not a would be indefi-
nite. And hence when there are two existences or but two modes of exis-
tence, and the one is named a, for instance, not a may be used as a definite
nae for the other, as truth, not truth— error; faculty of vision, not faculty
of vision — blind; heaving, not hearing — leaf, &c. But when there are more
than two existences or modes of existaDce, not, un, in dis, «&c., joined to
names makes an indefinite name.

But suppose that we had the knowledge of but two existance^, which
were inter se dfl^erentia, and we should give to each of them a s((;parate name,
as RBD and green for instance, we would tlien say red is not green. But not
OKKBN, if it be any thing, must under the supposition, be red, and we couUt
say, not green it red, i. e., not green and red are homon. But if we had a
knowledge of trirree differentia, red, white and green, for instance, and we
should say that red is not green, not green would stand far eitlier red or
WHITE, and would be indefinite. But what definite existence is meant in the
case, by not GREEN, would l>u indicated by the subject ot the proposititm,
RED, and hence red and tub not green are homon. And if not green and
KEP l>e homon in the pro|x>x>siion, UEO is not green, rru and green must be
Oifierentia; for in this proposiilion, red ami not green are homon, and in the
proposition, green and not red ale homon, green is, and red is; the homoni-
cal proposition, red is green, however, is not true, and the similical proposi-
tion, red is like green is also untrue, and 4ience we see how homcm lies at
the foundation of all propositions; and we see also that the pat tides not and
no, belong always to the subject or predicate and never to the copula.

We have now gone far enough, perhaps to make our nt;ws of propoai-
ti4>n8 be understood; yet it may h*i said that when we say snow h white and

T.4
we change the wording of this proposition into One of tk« gregaria of snoAr
and while are homon, we have but changed a simple proposition into a
complex pne ; suc)^ however is not the case. When we sey !Ekiward and
John f^TQ good, we can fully express in two pix>po8Uion th6 meaniag of the above phraseology, as Edward is good and John is good. But when we say One of the ^regana ot snow and whitee are homon, we can not resolve thia Into two propositions and say One of the gregaria of snow is the same thing and white is the same^thing, with "ny sf nse ; neither ca^ we resolve Thia grata of whe^
and that grain of wheat are simiha, into Thia grain of wheat is similia and that grain of wheat is similia. . And if we are right and we ar« understood ii^ our views of propositions, we think it will not be difiicult to explain hereafter the syllogism in all its modifications and functions.

CHAFl^R XVII.

THE SINGULAR SYLLOGISM.

In every legitimate syllogism, there must be two and only two propo-
sitions, which are called thQ premises, and a conclusion drawn from these preii^ises* It is also necessary that there be fpur subjectivtly lieterical exis-
tences, two of which, one in each premise, must be objectively hetera, ^nd two ol which must be objectively homou, or simUia or commensuru inter^se, and that the other two apear in th^ conclusion. The name of the homoni-
cal existence, or ol tlie similical or commensural existences, which ara in the premises, but not in the conclusion, is called the middle term, because it desig^iates or distinguishes the homonical existence or the similia, or com-
mequra, with whic1^, each of the existences, which appear in the conclu-
\sion Uas beep compared, and it la by means of thi^ homonical existence or similia or comillensura designated by this that middle term^ the comparison, between th9 other two existences isjefefected and the result get down in the conclusion, . Now it must appear upon the prinicple of pormutation that, if u, b and c be the terms of the premises, and we arrange a and b together and a an4 together,, we ca; i have four .and only four different arrangements in the premises; thus, a b, b a and a c, c a. And hence logicians have divided syllogisms fnto four figures, as they are called, according to the positions occupied by the middle term in the pi-emises. This middle term may denote the subjects of both propositions, or- pi'emisee, the predicates of both, or the subject of the firstjand the predicate of the second, oi* the predicate of (he first and the subject of the second. And h(?nce let a, or a and a when similia or comraensura are used be the middle term, and Ihe follovving.paradigm will show the figures :

1st figure. 2d figure. 3d figure.
ApsB IVisA AisB
C,isA C is A A is C

-Ois B i-^l«_?'-i^ii-^iEl^ff^~~^iL^M*

4th figure.
&A
Aisg
Now if we take the first four classes of propositions these may be combined two and two as premises, and hence the first figure will give nine kinds of syllogising according to the different manner in which we combine these four classes of propositions and so with the other figures. The following paradigms will show the manner of combining the first four classes of propositions in all the figures:

FIRST FIGURE.

First mode.
A & B are homon,
C & A are homon.

\[ \therefore C & B \text{ are eimilia.} \]

Second mode.
A & B are hetera,
C & A are hetera,

\[ \therefore C \land B \text{ are hetera} \]

Third mode.
A & B are similia
C & A are regnilia,
A & B are similia.

Forth Mode.
A & B are differentia,
C & A are differentia,

\[ \therefore C \land B \text{ are differentia, or Bimilia.} \]

5th.
A & B are homon,
C & A are hetera,

\[ \therefore \text{Sare heliellL} \]

A & B are homon,
C & A are hetera,

6th.
e homon,
e similia.

7th.
A & B are homen,
C & A are differentia.
8th.
A & B are hetera,
C & A are homon,
\[\ast\ast\] C & B are hetera.

9th.
A & B are hetera,
C & A are similia,
\[\ast\] C & B are similia or
differentia.

10th.
A <Sb B are hetera,
.C& A are differentia,
-. C & B are differentia or similia.

11th.
A & Bare similia.
C «to A are liomon,
\[\ast\ast\] C & Baresimilia.

12th.
A «fc A are similia,
C & A are lietera,
\[\ast\] C & B are similia or
differentia.

18th.
A & B are similia,
C <& A are differentia,
-. C & B arc differentia.

14th.
A & B are differentia.
«fc A are homon,
/\ & B are differentia.

15th.
A & B are differentia,
C & A are lietcra,
16th.
A & B are' differentia,
C & A are similia,
.*. C «& A are^ differentia.

MODES OF FIGURE SECOND.

1st.

2nd.
B & A are homon, \B & A are hetera,
V & AA* 8imUia, t & Aavg hetera,
.*. C & B are similia. • /. P. & B are hetera. .

3rd.
: B «fc A Ate slmHia,
i O A; A are eimifia,
: .*. G & B arc eimilia.

4th.
6 &'A are differentia.
C A Aave differentia.
.'; O A R are diff. or aim.

7a

5(h.
B &JA are homon,
C & A ve hetera,
..C& Bare hetera.
6th.
B & A are homon,
C ^ A are similia,
.'. C & B are Mmilla.

7th.
B & A are homon,
C & A are differentia,
.*. A; B are differentii.

8th.
B «& A are hetera,
C & A, are horn on,
.*. C & B are hetera.

9th.
B & A are hetera,
C& A are similia,
.-. C & B are sim. or dl1T.

10th.
B & A are hetera,
U & A are differentia.
.'C&B are diff. or sim.

11tb.
B&a Aare similia.

12th.
Bis % A are similia,
* A are hetera,
.-. C & B are sim. or diff.

13th.
B & A are similia,
O & A are difl^rentia,
.-. C & A are differentia.

.-. CA Baresiiuilia.

14th.
B & A are differenlhi,
V> & A are hoinon,
/. D<& Baredifferentia.

15th.
B & A are differentia,
C & A are lietera.
.\-. C & B are diff. or sim.

16th.
B & A are differentia,
C & A are similia,
.\-. C & B are differentia.

MODES OV FIOU1CR THIRD.

1st.

2nd.

3rd.

4|h.

A & R arei tianiQO, i A A li are heterft,
A\* (j^ C arc* honion, : A A C a e hetera.
.\-.V d BarvbimiHa; .* C & B are hetera.

; A A B are simiiHa, ; A it R are diffrmontia,
; A & C art* liiiiiilia, I A A C ttrt dhforoBtSa.
: .\-. C&B areaimilia. i .* C AB arc diff. or f(in.

5th.
A c% B are homon,
AifeC arehetvra,
.\'. A <= B are luttera.

0th.
A & B are lM}mon,
A & are similia,
/. (! & Bare similia.
7th.
A «& B are homon,
A & C are differentia,
•• CAB are differentia.

8th.
A & B arc hetera,
A & (/' are homon,
.-. C it B are, hetera.

nth.
A & Bare similia,
A & C are homon,
.-. C & B are similia.

Uth.
A & B are differentia,
A & are liomon,
.-.C&Baredilfcrentia

9th.
A & B are hetera,
A & Care similia,
.. & B are sim. or diff.

1Sth.
A & B*are similia,
A & Care hetera,
••.C& Bare Sim. or diff.

15th.
A i& B are differentia,
A & C are lielera,
.-. C & B are diff. or sim.

10th.
A & B are lietcra,
A & C are diterentia,
.-. C&Bare dif. or sim.

13th.
A & B are similia,
A & C are differentia.
. . C & B are differentia.

16th.

A & B are differentia,
A & C are similia,
B & C are differentia.

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MODES OP FIGUBE POTOETH.

1Bt.

B and A are homon,
A and C are homon,
.'. C and B are similia.

2d.

B and A are hetera,
A and C are hetera.
.'. C & B are hetera.

8d

A and B are similia,
A and C are similia.
.'. C & B are similia.

4th.

B A A are differentia,
A A C are differentia,
.'. CAB are diff. or sim.

6th.

B and A are homon,
A and C are hetera,
/. C and B are hetera.

m 6th.
B and A are homon,
A and C are Bimilia,
\[\therefore\] C and B are similia.

7th.
B and A are homon,
A and O are differentia,
\[\therefore\] C and Bare differentia.

8th.
6 and A are hetera,
A and C are homon,
\[\therefore\] C and B are hetera.

9th.
B and A are hetera,
A and C are similia,
\[\therefore\] C & B are sim. or diff.

10th.
B and A are hetera,
A and C are differentia.
\[\therefore\] C & B are diff. or sim.

11th.
B and A are similia,
A and C are homon,
\[\therefore\] C and B are similia.

12th.
B and A are similia,
A and C are hetera,
\[\therefore\] C & B are sim. or diff.

1Stfi.
B and A are similia,
A and G are differ^itla.
'. G and B are differentia.

14th.
B and A are differentia,
A and O are homon,
'. C & B are differentia.

15th.
B and A are differentia,
A and G are hetera,
'. G & B are diff. or sim.

16th.
B and A are differentia,
A and G are similia,
'. G & B are differentia.

To the foregoing paradigms, we will add another in which the existences are distinguished by their names, but without regard to figure.

1st.
Snow is white—homon.
The foam of the seas is white — homon.
Therefore, the colors of snow and of the foam of the sea are similia.

2d.
This marble is not that one— hetera,
The other is not this one—hetera,
Therefore, the other one and that one are hetera.
8d. The color of John's hair is like Mary's — similia. Mary's is like James' — similia. Therefore the colors of John's and James' hair are similia.

6th. Loaf sugar is sweet — homon. This loaf is not that apple — hetera. Therefore, the taste of sweet in this sugar, and the taste of that apple are hetera.

4th. An apple is not a peach — differentia. A pear is not an apple — differentia. Therefore a pear and a peach are differentia or similia.

6th. Su^ is sweet — homon. This bread tastes like sugar — similia. Therefore the taste of this bread and sweet are similia.

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7th. Sugar is sweet — homon. Vinegar is not sweet — differentia. Therefore the tastes of sugar and of vinegar are differentia.

9th. This apple is not that one — hetera. This pear tastes like that apple — similia. Therefore the tastes of this apple and this pear are similia, or differentia.

8th. This biscuit is not that one — hetera. This biscuit is sweet — homon. Therefore the sweet of this biscui
and the taste of that one are heters

10th.
This apple is not that one—hetera,
This pear does not taste like that appl
—differentia,
Therefore the tastes of this apple and
of this pear are differentia or similia

11th.
This cake tastes like sugar—similia,
Sufijar is sweet—homon,
Therefore the sweet in sugar and the
taste of this cake are similia.

13th.
The color of the barn is like that of
the house—similia,
The color of the stable is not like that
of the house—differentia.
Therefore the colors of the barn and
stable are differentia.

15th.
This cake is not sweet—differentia,
This bread is not the cake—hetera.
Therefore, the taste of this bread and
sweet are differentia or similia.

12th.
The color of the barn is like that of
the house—similia,
John's barn is not the barn spoken of
—hetera,
Therefore the colors of John's barn
and of the house are similia or diff.

14th.
Sweet is not sour—differentia.
Sugar is sweet — homon.
Therefore the taste of sugar and soui
are differentia.

H

16th.
This cake is not sweet — differentia,
This bread tastes like the cake — sirn. I
Therefore the taste of this bread an^
sweet are differentia.
— i

Now from the foregoinaj paradigms, we see that like numbered mode^
in each figure give like results in the conclusion and that in each figure wq
obtain eleven categorical and five disjunctive conclusions. From homoni^
cal premises (1) we obtain similia in the conclusion; from heterical premise^
(2) hetera; from similical premises (3) similia; from differentia premises (4)
differentia or similia; from homo-heterical premises (15 and 8) hetera; from
homo-similical premises (16 and 11) similia; from homo-differentia premi-

ses (7 and 14) differentia; from similo-heterical premises (9 and 12) simi-

lia or differentia; from similo differential premises (13 and 16) differentia;
and from heterico differential premises (10 and 15) differentia or similia; in
all clearer categorical and fine disjunctive conclusions. And of the catego-
rical conclusions, four are similia, three are hetera and four are differentia.
Now the foregoing figures with their modes exhaust the power of sylogising
with the first four kinds of propositions>i thi"^fM1tJ"yS"tWwM.

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But the fifth and sixth classes of propositions may be combined with
homonical and heterical propositions, in figures and modes similar to those
already exhibited. And letting A stand for the middle term, as before, the
following paradigm will show the combinations in the first figure; And
with the fifth and sixth classes of propositions we may use the sign =- equal
to, between commensura, and > or < the sign in commensura, just as in
mathematics.

1st.
A & B are homon,
C & A' rfre homon,
.~. C=B.

2d.
A & B are hetera,
C & A are hetera,  
.-. C «& B are hetera.

3d.  
A=B,  
C=A,  
.-. 0=B.

4th.  
A>B A<B i A<BorA>B  
OA C<A j C>AorC<A  
.-. C>B  
.-. C<B  
.-. C=Bor C<Bor OB

5th.  
A and B are homon,  
C and A are hetera  
.-. C and B are hetera.

6th.  
A and B are homon  
C>A  
.-. C=B.

7th  
A and B, are homon,  
0<A, : or OA  
.-. C<B  
.-. OB.

8th.  
A and B are hetera,  
C and A are homon,  
.-. C and B are hetera,

9th.  
A and B are hetera,  
C=A  
.-. C=Bor C<Bor OB.

10th.  
A and B arc hetera,  
C>A|orC<A,  
.-. C=B, or OB, or C<B,

11th.  
A=:B,  
C and A are homon,  
.-. C=B.
12th.
A=B,

C and A are hetera,
\( \therefore C=B, \text{ or } C<B, \text{ or } OB. \)

13th.
A=B,

C<A, \ : \ or \ OA,
\( \therefore C<B, \text{ ; } \therefore OB. \)

14th.
A>B, or A<B,
e and A are homon,
\( \therefore OB \text{ i } \therefore C>B, \)

15th.
A>B i or A<B,
C and A are hetera,
\( \therefore C=B, \text{ or } C<B, \text{ or } OB. \)

16th.
A>B or A:<B,
C=A : C=A,
\( \therefore C>B \text{ : } C<&B. \)

We do not deem it necessary to give paradigms of the modes of the
remaining three figures in which homonical, heterical, commensural and in-

commensural propositions are combined. Now the four figures with their
modes, in which the first four classes of propositions are combined and the
four figures with their modes, in which homonical heterical, commensural
and incommensural propositions are combined, exhaust the whole power of
syllogising in singular syllogisms, i.e., in comparing two existences by the
means of an homanical existence or of two simical or commensural exis-
tences. We have, not put the words— all, every, no &c., before any of the
terms, because these words, as we have heretofore shown, do not change the
character of the affirmation, but belonging to the terms they are used to dis-
tinguish and characterise the existence, which we are comparing, and they
may be thrown out of every proposition, in which they occur, excepting
numerically complex propositions, by changing the wording of the proposi-
tion and without affecting the result; as all men are mortal, is equivalent to
man is mortal, i.e., one of the gregaria sine qua non of man and mortality are homon. The propositions. All the Apostles were Jews; All the boys in the room are barefooted, &c., are numerically complex propositions, and they are not used in the singular syllogism. The words — some, most, a few, &c., also distinguish merely the numerical relations inter similia upon a certain generalization. And by the custom of our language, every proposition, in which they occur, may be stated in other words, which shall not express, but imply their substance; as some apples are sour, into all apples are not sweet; i.e., sweet and sour are not gregaria sine qua non of apples. And hence, SOME, MOST, a FEW, &c., show, in propositions, an indefinite numerical relation among apples, for instance, which as apples are similia, but which, outside and over and above the gregaria, sine quibus non, possess other gregaria, which, when considered, enables us to distinguish and further differentiate.

CHAPTER XVIII.

EXPLANATION OF THE SYLLOGISM.

If a man were in a wood among fallen timber and found two logs, which he was unable to lift, and whose comparative lengths he desired to know, without the use of the syllogistic process he would not be able to accomplish his object. If however, he should cut a rod, which we will call A, he could go with it to the first log, which we will mark 1st, and find that 1st and A are commensura, and then with his rod he could go to the second log, which we will mark 2d, and find that 8d and A are commensura and then he would have the premises of a syllogism: 1st and A are commensura, 2nd and A are commensura, therefore 1st and 2d are commensura or 1st=A, 2d=A, if it be so and therefore 2d=1st. And without the power to syllogise the carpenter could make no use of his foot-rule, the shoemaker no use of his last, the farmer no use of his half-bushel; no one could put into a pile one cord of wood; and no one could tell without first having knocked his hat off, whether the door in his house was high enough to let him enter without bending his body. The process of syllogising is used by every person in the daily vocations of life, and it always has been so used from the creation of man.

But notwithstanding the almost constant use of the syllogism by all men, the process itself has been misunderstood both by the friends and the enemies of logic. The opposers of logic have represented that if the syllogism be a true process of reasoning used by us in matters about which we reason, men could not have reasoned at all before the time of Aristotle, who is regarded as the true expounder of logic; which is argument is analogous to the following: If the wheels of a wagon turn upon the principles of the lever before these principles were understood men could not have driven wagons. The contempt, however, which the opposers have heaped upon logic, and of which its friends complain, is not owing to the want of a syllogistic process in the mind, but to the circumstance that the friends of logic have been neither able to explain this process, nor to refute the objections of its advisaries.

For the explanation of the syllogism, most of the writers upon logic have relied upon the Aristotelian dictum de omnibus et nullis—what ever can be predicted of a class can be predicted of any individual of that class—and hence they say that the middle term must always be distributed in one of the
premises by being the subject of a universal affirmative or the predicate of a negative proposition, which in our opinion amounts to nothing so far as the syllogistic process itself is concerned. For a class is nothing else than several individuals inter se similia, or but one individual differentiated from all other things; and hence the dictum asserts merely that whatever can be predicated of each one of similia can be predicated of any one of similia; and although this is true, it is but a part of the whole truth. If we have before us several marbles, the colors of which are inter se similia, we may with equal truth, turn the dictum the other way, and say that whatever can be predicated of the color of any one of the class, can be predicated of the color of each one of the class, for the reason that the colors are inter se similia. And for the same reason and for none other, to-wit, that the individuals are similia in the respect in which every one or any one is spoken of, or joined with a certain predicate in a proposition, does the dictum mean anything: that there actually are in nature similia, differentia, commensura and incommensura, is the foundation of the dictum, and yet a syllogism may be constructed of homonical or heterical premises. And from the notion that in every syllogism the middle term must be distributed in one of the premises, i.e., stand for a whole class of individuals eo nomine et innmero; while in truth it is never does so stand, but always represents an homonical individual, or an individual of similia, or of commensura, the friends of logic have been overpowered by their own logic. And hence the friends of logic have conceded to its adversaries, that in every legitimate syllogism, the conclusion contains nothing which is not employed and virtually asserted in the premises. For say they we reason from generals to particulars, and what is true in general is true in particular – dictum deomni et nullo. And although J. Stuart Mill was able to see that Aristotle's dictum was only adapted "to explain in a circuitous and paraphrastic manner the meaning of the word class." Yet he too along with the rest was overpowered by the dictum. And hence he says "It must be granted that in every syllogism considered as an argument to prove the conclusion, there is a petitio principii. When we say all men are mortal, Socrates is a man, therefore Socrates is mortal, it is unanswerably urged by the adversaries of the syllogistic theory, that the proposition, Socrates is mortal, is presupposed in the more general assumption, all men are mortal; that we could not be assured of the mortality of all men, unless we were previously certain of the mortality of every individual man; that if it be still doubtful whether Socrates, or any other individual you choose to name, be mortal or not, the same degree of uncertainty must hang over the assertion. All men are mortal; that the general principle, instead of being given as evidence •! the particular case, can not itself be taken for true without exception, until every shadow of doubt which could affect any case comprised with it is dispelled by evidence aliunde and then what remains for the syllogism to prove? That in siort, no reasoning from generals to particulars can, as such, prove any thing; since from a general principle you can not infer any particulars but those which the principle itself assumes as foreknown. This doctrine is irrefragable."

Now this "irrefragable doctrine" is owing to a misconception of the nature of propositions and of their combinations in the syllogism. In the first place it it not true, although it has generally been conceded to be so, that there is nothing contained in the conclusion, which is not implied in the premises. In the syllogism, A and B are similia, G and B are similia, therefore C and A are similia, we have indeed the existences A and G in the prenuses, their relation, however, to each other, is neither expressed nor implied in either of the premises, but it is evolved from the combination of the premises. And if it be meant that by the combination of the premises
the conclusion is implicated, this indeed is true, but this certainly can not be urged as an objection, for it is of itself an approval of such combination for the purpose of gaining a result, which we can not obtain without such combination. In order to understand this matter clearly, it is necessary that we enter into an elaborate explanation of the syllogism. We have shown heretofore that when the existences really compared in any proposition are clearly set out by the wording of such proposition, the terms of the proposi-

tion may be transposed; as all men are mortal, i.e., one of the gregaria sine qua BOQ of man and mortality are homon, and by transposition, mortality and one of the gregaria sine qua non of man are homon. And hence when a proposition is so worded that the terms may be transposed (and every proposition can and ought to he so worded when it is considered in a scientific view) it may be combined with another proposition worded in like manner, in any one of the four figures; and therefore, an explanation of the syllogism in any one of the sixteen modes of any figure, will be an explanation of the like numbered modes in all the figures.

We will commence our examination, therefore, with mode 1st in the paradigms in which the first four kinds of propositions were used. Take the syllogism. All snow is white or snow is white. The foam of the sea is white, therefore the colors of snow and of the foam of the sea are similia, i.e., snow and the foam of the sea are similia in one facial gregarium — color — which facial gregarium of snow and that of the foam, of the sea, have each of them been differentiated from the other four nominal truths into color; but inter se they could not be differentiated, and therefore they are similia. But we have heretofore shown that lietera lid at the very foundation of our knowledge. Suppose then that we look at the color of paper, and without any reference to discrimination say — this is; and having turned our eyes away from it, look at the same paper again and say — this is; now is this the thing which, we have said, rs, when considered as grounded in the ego, the same thing in both cases? certainly not; and why not? Simply for the reason that their times can be heterated, and the power of our minds to heterate, gives us the knowledge that then and now are hetera and that an existence grounded in the ego five minutes ago is not subjectively the same existence grounded in the ego now. But if two existences can be heterated only, the two must be to us inter se similia; and therefore when we have said, this is, and that is, if we can discriminate no farther we must say, this and that are similia, and merge the two homonical propositions into one simical proposition. Returning therefore to the premises, Snow is white. The foam of the sea is white, the heterical whites are similia we can discriminate them no farther than into hetera, and hence the conclusion must follow that the color of snow and that of the foam of the sea are similia. But when we say. Snow is white. The foam of the sea is white, therefore the colors of snow and of the foam of the sea are similia, we must recollect that the heterical whites, which are subjectively similia, have, each of them, an objective where, and therefore they are also objectively similia, while if we should project them into an homonical where, they would be objectively homon. The above premises, therefore, contain four subjective existences, two of which the heterated whites, are subjectively and objectively similia; objectively however, there are but two existences in the
premises to wit, the color of snow and the color of the foam of the sea; and objectively the syllogism in mode 1st, in the conclusion locates these objective existences, as similia in their respective wheres.

Mode 2d, if we consider the four heterogeneous existences of the premises merely subjectively, they would not bring us into a conclusion; but two of the subjective existences must be considered as occupying an homonical where in an homonical time; they must be objectively homon. When we say 1st and 2d are hetera, 3d and 2d are hetera, therefore 1st and 3d are hetera, the two subjective 2d8 must be referred to an homonical where at an homonical where in an homonical time; but 1st and 3d, cannot be homon for they are not compared with each other in either of the premises, but they are brought together by means of 2d, and if 2d and both 1st and 3d, be hetera, as stated in the premises, 1st and 3d must also be hetera. It may, however, be said that in this mode the conclusion does not follow from the combination of premises; for, if we put before us three objective existences, marked 1st 2d 3d, we can say first is not third, without comparing each of these with second. This is true; but it is the distinguishing terms, 1st and 3d, which enable us to jump the middle existence. Suppose we apply our nose to a rose and say This (1st) smell is not that scent, we then apply our nose again and say. This (2d) smell is not the 1st smell, therefore 2d smell and that scent are hetera. In this case the 1st smell, which is the middle existence appears twice subjectively, but we refer these two subjective existences to an homonical where and time, and therefore they are homon, and without this middle existence we could not gain the conclusion, that second smell, and that 1st SCENT, the homonical scent mentioned in the first premise, are hetera.

In mode 3d, each of the premises is a conclusion drawn from a former syllogism: as A is white, B is white, therefore the colors of A and B are similia, (mode 1st); A is white, C is white, therefore the colors of A and C are similia (mode 1st); and from these conclusions we form the premises, A and B are similia, C and A are similia, and hence C and B are similia — conclusion. Mode 3d needs no further explanation.

Mode 4th is somewhat more difficult. When we say, sweet is not sour, bitter is not sweet, we are apt to look back at the words sour and bitter, and as these words distinguish differentia, we see from the terms that sour and BITTER are differentia, and hence we are apt to infer merely differentia from the premises. When we say, A peach and a pear are differentia A potato and a pear are differentia, we will naturally say, A potato and a peach are differentia, which indeed is true, but it is not therefore true, it does not follow from the premises. No categorical conclusion can be legitimately drawn from these premises, the conclusion which really does follow, is that a potato and a peach are either differentia or similia. This will easily be seen if we treat a peach and a potato merely as hetera and call the peach first, and the potato SECOND: then dismissing from our mind those differential names, we say, 1st and a pear are differentia, 2d, and a pear are differentia, and as we do now see from the terms 1st and 2d whether they be differentia or not, the conclusion follows legitimately in our minds from the premises, and we conclude that 1st and 2d are differentia or similia.

The fifth and eighth modes, which are in substance alike, are «asy-.

The color of this marble is white, the color of this marble and the col^r of
THAT one are hetera, therefore the color of that one, let it be what it may, and the white in the first marble, are hetera. Snow is white, snow and paper are hetera, therefore the color of snow and the color of paper are hetera, i.e., snow has a color and paper has a color and the two colors are hetera.

The sixth and eleventh modes, which are similar in substance, contain greater difficulties. When we say this apple is sweet, that pear tastes like this apple, it is quite clear that the conclusion, therefore, that pear is sweet, follows from the premises, though this conclusion is an homononal proposition. The taste of this apple and sweet are homon, the taste of this apple and that of that pear are similia, therefore the sweet in the apple an the taste in the pear are similia; but similia have a common name, and therefore the taste in the pear when named, is called sweet, and we say in the conclusion, that the pear is sweet, i.e., that the taste of the pear and sweet are homon. Now if we examine the above syllogism closely, we will see, that in the premises there are subjectively four heteretical existences, to-wit: 1st, The taste of this apple; 2nd, Sweet; 3rd, The taste of this apple; and 4th, The taste of that pear; three of which subjective existences are objectively homon. The taste of that pear only, is located in an heteretical where with reference to the where occupied by "The taste of this apple, sweet, and the taste of this, apple;" the other three heteretical existences of the premises subjectively; but objectively these three are homon. But the sweet mentioned in the conclusion is not objective! Homonal with the sweet in the first premise, they are objectively similia, and because they are similia they have a common name and we say This pear is sweet, i.e., one of the gregaria of this pear and sweet are homon. Therefore in modes 6th and 11th there are but two objective existences in the premises, which are inter se similia, and in the conclusion, one of these similia appears located in one of the objective whebes mentioned in one of the premises, as the other one of the similia was located in the other where in the other premise. In mode first we saw that of the four subjective existences in the premises, the two in the first premise were homon, and the two in the second premise were homon; in modes 6th and 11th, the two subjective existences in one premise and one of the subjective existences in the other premise, are objectively homon. And we must see that if we take the conclusion. The sweet in this apple and the taste in that pear are similia; and dress it in common language, viz: That pear is sweet, and then combine this conclusion with the homononal proposition of the above premises, and we will be in mode first, and will gain the other premise of the above syllogism as the conclusion: The taste of this apple is sweet the taste of that pear is sweet, therefore the tastes of the pear and apple are similia. And to make the matter still clearer, we may suppose three persons, whom we will call A, B and C, to be sitting in a room with two apples in their hands. A tastes both of the apples and says secretly to himself, "this apple is sweet and that apple is sweet," and then drawing the conclusion in mode 1st, he says aloud, "this apple tastes like that one;" B then tastes one of the apples and says, "this apple is sweet;" well then says C from what A and B say, "the other apple is sweet also."

But hitherto we have not used what are called universal propositions for either of our premises, and when geusal propositions are used in mode 1st, it is then, that a petitio principii is supposed to occur. We did not discuss this matter when treating of mode 1st, for the reason, that we desired to get the reader further along in the knowledge of some of the other modes so that he might be better prepared for such discussion. When we say, all men are mortal, Socrates is a man, and, therefore Socrates is mortal, it is said that the conclusion, Socrates is mortal is implied in the first premise. All men
are mortal. The difficulty in this syllogism is, indeed somewhat below the surface, but if we set clearly before us the existences, which are really compared in the premises, the solution will be more easily obtained. All men are mortal, or its equivalent, Man is mortal, shows that one of the capacial gregaria sine qua non of man and mortality are homon; Socrates is a (one) man, shows that the existence called Socrates and one of the existences called man are homon; and therefore Socrates, who is homonical with one man, and other men are similia, in mode 1st. The simile, mortality, exists in every object, which may be called man, but Socrates, i. e., the object designated by that name, may be called a man, and therefore this simile exists in Socrates; for MAN is the common name of similia. In the foregoing syllogism let us write the premises and conclusion thus: Socrates and ▲ man are homon. One of the gregaria sine qua non of man and mortality are homon. Therefore the gregaria sine qua non of man and the gregaria of Socrates are similia, and One of these gregaria of Socrates then must be mortality, Socrates must be mortal.

Suppose we look back to what we have called nominal truths, where we saw that when an object of vision arose into consciousness we called it COLOR, to distinguish it from conscious truths of the other senses; and suppose that the first object of vision should have been the color, which we now call red; red then would have been called color, to distinguish it from conscious truths of the other senses. Then suppose green to have arisen into consciousness, green too would have been called color, to distinguish it from objects of the other senses, and then red and green, as color, as distinguished from objects of the other senses, are inter se similia, and therefore each of them is a color. Now, if we collect into an homonical proposition the very thing, which enables us to differentiate objects from other things into colors, to-wit, visibility, we will say, All colors are visible, or its equivalent. Color is Tisible, i. e., Color and visibility are objectively homon, and if we then add That red is a color, i. e., Bed and one color are homon, it will follow that the object called red and visibility are similia i. e., red as an object distinguished from conscious truths of the other senses is distinguished in the same manner as other colors, to-wit, by being visible. And we must perceive that the first premise gives visibility as the ground of differentiation from the conscious truths of the other senses, the whole of which ground lies partly in the visual faculties and partly in external objects, that is, in the relation of these, and it gives also color as the name to distinguish that part of the ground lying in external objects; and hence color and visibility are objectively homon. The second premise takes one of the subjective similia so differentiated, and pronounces this simile andRisD, a color further distinguished among colors to be homon; and hence this simile and any other simile are similia (non simile est idem) and red as a color and visibility, when located in the same where, are homon, for similia have a common name and when their wheres are homonical, they are objectively hemon.

Again, suppose we take several sticks, each one of which we dot with differently colored dots in such manner that by looking at the sticks when thus dotted, we cannot by the dots discriminate one stick from another, and suppose that each dot on any stick can be discriminated from any one of the other dots one the same stick, and to distinguish the dots inter se, we call on^ A, another b, c, d, &c. Now letting the dots in the aggregate ▲ the very things, which distinguish the sticks before us from other things, we will call these dots, in the aggregate, in fasceculo, A. But supposing that by the
lengths of the sticks we are able to distinguish the sticks inter se, we will
call a particular stick B, another C and another D. Now we can say that
one of the dots of every A is a, i. e., one of the dots of any A and a are ho-
on. But B, this particular stick, which I now hold in my hand and men-
tion by the name B, is a (one) thing, whose aggregate dots are called A, i. e.
B and one of the A's are homon, therefore any one of the A's excepting the A
which I hold in my hand and mention by the name B, and the A which I
hold in may hand and which is the same thing as B, are similia; and hence
the homonical a which we find in any A excepting the A, which is also B
has a simile, a dot like itself, in the A in my hand which I may call also B*
B is A.

It must be confessed that the exposition of this matter is some what'
difficult; and heretofore all logicians have failed to understand thetnxe statf

of the case, but by thinking over the matter for several times, we hope the
reader will be able to see through it. Perhaps it will appear more clear to
some minds, if we dismiss differential terms for the agjE^regate existance, and
distinguish them merely as hetera; then one of the gregaria sine qua non of
1st object and mortality are homon ; let this be our first premise. And then
it must appear that if we say a second object and the 1st are similia, it will
follow la mode 6th, that the simile mortality located in the first objects has a
siMiLB located in the second one and this simile is mortality. But if after
the first premise, we say that the 2d object is one of the first kind ot objects,
this proposition, though homonical, is quasi simical, and the conclusion
trom the homonical premises that the gregarium mortality located in the 1st
object has a simile in the second one is quite evident, and this simile located
in the second object must be called by the common name, mortality, and
hence one of the gregaria of 2d object and mortality are homon. All men
are mortality, i. e ., one of the respects in which men are similia and mortality
are homon; Socrates is a man, i. e.. The object called Socrates and one of the ^
similia named man are homon ; therefore the respect, to-wit, mortality, in
which men are similia and which is a gregarium in other men, and this res-
peet in the object called Socrates, since he is a man — Socrates is mortal.

The reason that B3'illogism, like the above are so di^cult to understand,
is that we lose sight of the wherbs in which the bbspects, the gregaria,
which render objects similia, exist. When we say, Snow is white, the snow
in which this gregarium white, exists, or did exist, has or had an objective
WHBBBB, but this where is indefinite and undistinguished in our minds from
other wheres. But when we announce to a friend in the street that Snow is
white and then add that an object in our house, which object the friend has
never seen nor heard of before, is snow, he will immediately conclude that the
colors of the object in our house and of the snow located in an indefinite whjcbe
are similia, and therefore he would say that the object in our house is white.

Now we do not concede that this argument is a petitio principii, that
when we say all snow is white, we imply, that the object in the house is white;
before this conclusion can be reached, without seeing the object itself, we
must first learn that the object in the house and snow in the respect of color,
are similia, and this we do when we are informed that the object in the house
Ind one of the similia named snow are homon. So when we say all mea
are mortal, we do not imply anything respecting the object named Socrates,
for Socrates may beithe name of a statue or of a fictitious god like Jupiter.
In the syllogism, all men are mortal, Socrates is a man, and therefore So-
crates is mortal, however, both premises us they are usually unnderstood, and
the conclusion, are false. Iron already tused is not fusible unless it he first
congealfid again; neither are dead men mortal, requiem eternam Domine da eis.

In the sillogism, All men are mortal. All kings are men, therefore all

kings are mortal; mortality is one of the gregaria sine qua non of man, and
man is a sine qua non of a king, and therefore mortality is a sine qua non of
kings. It may he said, indeed, that when we say All iron is fusible; so soon
as we say of any object that it is iron, we have already in the first premise
asserted that it is fusible, and it is true that by the combination of the prem-
ises we reach the conclusion: and this is the case in every syllogism, whether
either of the premises be a universal proposition or not. When we speak of
particular objects and say A and B are similia, so soon as we say A and C
are similia, we bring B and C to be similia, yet there is no petitio principii
about it.

Now when we say Man is mortal, we mean that one #f the gregaria
sine qua non of man and mortality are homon: but when we say Man is A
mortal, we mean that each man and one of the similia, each one of which is
named a mortal or mortal being, are homon: and this proposition brings
man among the similia called mortals, in each one of which there exists the
simSimLE—mortality. We have perhaps gone far enough with the explanation
of this matter.

Modes 7th and 14th are very easily understood: Sugar is sweet—
homon; Ko vinegar is sweet, or Vinegar is not sweet—differentia; There-
fore the tastes of sugar and vinegar are differentia. The 9th and 12th modes
are easy; and after having gone through the previous explainations, we do
not deem it necessary to consider the remaining modes, as the principle of
each of them has already been exhibited in some of the foregoing explain-
atios. It may, however, be well enough, in order that the reader may have
a clear understanding of our system, to take a view of those rules which
writers generally have laid down for the regulation of the syllogism.

And in order that the reader may better understand the whole matter,
it must be observed that logicians have divided propositions into universal
affirmative, as All men are mortal, which class of propositions they distin-
guish by the symbol A; universal negative marked E, as No gold is green;
particular affirmative marked I, as Some islands are fertile; and particular
negative marked O, as Some men are not black. And with these four classes
of propositions they commence to syllogize and to construct rules for obtain-
ing true conclusions.

And the first rule which they give, is that Every legitimate syllogism
must have three and only three terms— the middle and the two terms of the
conclusion. ' Although this rule, if we look merely at terms, be true, yet we
consider logic to be concerned about more than terms, and therefore, we state
instead of this rule that In every legitimate syllogism, there must be four and
only four subjectively heterical existences in the premises, two of which— one
in each premise— must be objectively hetera, and the two of which with
which the other two are each compared, must be objectively homon, or
similia or commensura inter se.
The second rule which they give, is that Every legitimate syllogism must have three and only three propositions: in this we are agreed.

The third rule which they give, is that The middle term must not be ambiguous. This danger is sufficiently guarded against by our first rule respecting every legitimate syllogism.

The fourth rule which they give, is that The middle term must be distributed once at least in the premises by being the subject of an universal affirmative or the predicate of an universal negative proposition. For, say they, if we say white is a color, black is a color, in which propositions the middle term — a color — is not distributed, we will conclude falsely that black is white. But after what we have said heretofore, we think, it will readily be perceived that both of the above premises are homoncal propositions and that the predicates of each — a color — are objectively two and not one and the same existence, they are not homen, and that these two existences have been differentiated from existences of the other senses, into colors, in which class of existences as distinguished from other things, as nominal truths, they are similia, the name color will distinguish either of them from existences of the other senses. When therefore we say, white is a color, black is a color, it does not follow that white is black, but that white and black as distinguished, not inter se, but from other things are similia. White is a color, black is a color, therefore white and black, as nominal truths, are similia. But it does not follow that inter se, white and black are similia, unless it appear that the predicate, a color in the first premise, and the predicate, a COLOR in the second premise are inter se homen, or similia; the middle term therefore is faulty, not because it is not distributed, but because two existences are used which do not appear to be inter se similia. The fourth rule, therefore, laid down by writers, as a guide to keep us upon the true process of the mind in syllogising correctly, we conceive to be, not only of no value, but erroneous.

The fifth rule given, is that No term must be distributed in the conclusion, which was not distributed in one of the premises. "All quadrupeds are animals, a bird is not a quadruped, and therefore a bird is not an animal." This conclusion is evidently erroneous; and it is quite clear that those, who were engaged in the construction of this rule, saw, independently of the syllogistic process in the premises, the error in the conclusion, which from the appearance of the words in the premises might be supposed to follow legitimately. The proposition, "All quadrupeds are animals." means simply that each quadruped and one animal are homen, and when we add that a bird is not a quadruped, i. e., that each bird and any quadruped are differentia, it does not follow that each bird and any animal are differentia; what follows legitimately, is that each bird and the animals homenical or similical with the animals inaluded in the predicate of a color in the premises are differentia. For bird and animal are brought into the comparison in the conclusion by means of an homenical existence or similical existences, with which they were each of them compared in the premises. We stated in our first rule that each existence, which appears in the conclusion, must be compared in the premises with the same middle existence or with two existences inter se similia or commensura.
And in the above premises quadruped is compared with one animal, and quadrupeds being inter se similia, bird is then compared with one of these similia, and the conclusion must be that the animal compared in the homonimal proposition and found to be one of the quadrupeds and every bird must be differentia, but nothing can be inferred respecting any other animal, except it be a simile, than the animal spoken of in the first premise, which was homonimal with quadruped. Red is a color, Green is not red, arc premises just like the former, and from them it follows that the one color homonimal with RED and green are differentia. The fifth rule therefore is of no value in our system, it is erroneous and falacious as a grade in the syllogistic process.

The sixth rule given, is that From negative premises you can infer nothing. This rule in our system has no meaning, for, we do not admit that there is any such thing as an independent negative proposition.— But calling such propositions, which have no, none and not in their negative, the rule itself is not true, it is only true that we can not infer a categorical conclusion. From the premises "A fish is not a quadruped, A bird is not a quadruped," it legitimately follows that a fish and a bird are differentia or similia (mode 4tb).

The seventh rule given is that if one premise be negative the conclusion must be negative. This rule in our system means nothing.

Now in stating every homonimal proposition, such as All men are mortal, we must be careful to see whither the predicate be one of the gregarial of the subject or not; for if it be not, and it be represented by an adjective name in order to make the proposition clear, some noun must be placed after it, or understood for adjective names which are not the representatives of gregaria, are the names of existences standing as a class by themselves. When we say "All gold is precious," we mean that all gold and one of the things esteemed of value among men, are homon; the proposition therefore should be stated this; All gold is a precious thing, and then we can add that All gold is a mineral, and it will follow that the mineral homonimal with gold is a precious thing. Mr. Hamilton gives as the second rule, that "The subsumption must be affirmative," and he illustrates this rule by the following example; "All colors are physical phenomena, no sound is a physical phenomena;" "Here" sajw he, "the negative conclusion is false, but the affirmative, which would be true – all sounds are physical phenomena— can not be inferred from the premises, and therefore no inference is competent at all."

(page 289 ) After what we have said heretofore, I think, it will be very easy to see through Hamilton's mistake. When we say that "All colors are physical phenomena," we mean that each color is a (one) physical phenomenon, and when we add. No sound is a color, we mean that any sound and any color are differentia, and therefore we can infer, not that no sound is a physical phenomena, but that all physical phenomena homonimal with colors and sounds are differentia. We have gone far enough perhaps, in this direction to make ourselves understood by the reader.

Before leaving this chapter, however, it seems necessary, that we should make some remarks tending in another direction. It is the unanimous doctrine of logicians hitherto, that one of the premises at least must be what they call a universal proposition, otherwise no legitimate conclusion can be drawn. And hence, if we should take a stick and apply it to a table and find the lengths of the stick and table so be commensura, and then apply...
the stick to another table and find the stick to be longer than it, and we should then make the following statement: 1st table = stick, 2d table > stick, therefore 1st table > 2d table, this would not according to the received doctrine be a legitimate syllogism. But if this be not a legitimate syllogism, what is it? General propositions are necessary at all to enable us to syllogise, excepting when we wish to syllogise with gregaria or a gregarium sine qua non of objects. When we say all A is b, i.e., one of the gregaria sine qua non of A and b are homon, no B is b, i.e., the gregaria sine qua non of B and b are differentia, it follows that A and B are differentia. In such cases as these, general propositions are necessary; but such cases come from but a part of the instances, in which the syllogistic process is used. And from the consideration no doubt, that general propositions are always necessary in order to be able to syllogise, J. Stuart Mill, concluded that the syllogistic process was not really inferential reasoning. He says **In the above observations it has, I think, been clearly shown, that, although there is always a process of reasoning or inference, where a syllogism is used, the syllogism is not a correct analysis of that process of reasoning or inference; which is, on the contrary, an inference from particulars to particulars: authorized by a previous inference from particulars to generals and substantially the same with it; of the nature, therefore, of induction.**

>Now when we tell a friend that the height of a stove in this room is commensural with the height of a stove in the other room, which latter stove the friend has never seen, and that, the height of this stove is three feet, and then ask him from these data to tell us the height of the stove in the other room, if he does not syllogise and on the syllogistic process make an inference, I would like to know in what other manner, by what kind of induction, he would be able to solve the problem. Digitized by Google

chapter; XIX.

EXPLANATION OF SYLLOGISM CONTINUED.

Having explained the syllogism, in which the first four classes of propositions are combined, we come now to give some further consideration to the syllogism combining the first and second and fifth and sixth classes of propositions. And of the manner, in which the first and second classes of propositions are combined in the syllogism, we have already said sufficed; it is to the manner of combining commensural and incommensural propositions, therefore, that we will more especially direct the attention of the reader. In our explanation of propositions heretofore, we observed that, syllogistic and differential propositions spring from homonical propositions; we showed this to be the case also with commensural and incommensural propositions. Homon is at the bottom of all propositions; hetera at the bottom of all knowledge; and the power of the mind to hetera depends upon time and space. We must also perceive that, homonical propositions, which are collected into heterical, similical, differential, commensural or incommensural does, must in every instance have a local reference in the subject or predicate; for, in every proposition there is a comparison between two existences, and if these two existences be considered merely heterically, they can not subjectively be homon; to be homon the subjective l’etera must be located in an homonical where at an homonical time. We have already Seen, how we come to have the knowledge of existence; and after this has been obtained, we may say indeed, that this grounded in the egoaUd one existence grounded in the ego are homon; but when the one existencb is grounded in the ego, it is located there in the same where with this, and at an homonical time; and the ONE kxibtencb and the this referedto must also, irrespective of time and space, be subjectively similia, otherwise the bringing them into ag ho-
monical where at an homononal time will not make them homon. An object may be heard by the ear and another seen by the eye; irrespective of time and space they are differentia, and although they may subjectively be located in the same way at an homononal time they do not become homon. i^Q^I

where we say. This is an existence, and then again, That Is an existeticeV tlie first existence and the second one are hetera, and if they can not be discrim* nated further they are similia. Existences, however, is a name) whict does not distinguish existences inter se. But if we say, This is white, and then again, That is white, as white is a name, which distinguishes existences Inter se, if the first thing and the second be not similia, in respect of color the word, white has been misapplied to one or both of them.

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Now in commenjsural and in in common sural propositions, the things conapared are always similia, yet commensural and incommensural propositions are derived from similia but from homon. If we take a certain stick and say, the length of this stick is one (the unit) i. e., the length of this stick and one are homon, itod. wis i then gb- to an other stick and say, the length of this stip^ f^j-ofl p;ne -ar? .^odi'on, if4Ue leaqUs.nof the two sticks be npt.cojc'c'tj'pinsuf.^.* ON* h^ no. definite', meaning; and we can give a definite m*aajilog l^" "l1iE <july by lukingsame h'monical Uiling as the unit of naasas- iiireipeiat. If then wftniakc tUe-lengthtb of a particular! *stick the homonical thing by which to (Icfiut; o.n k, and appMy tl^is length to another stick, and we qi^n not diacrlJnJnati; Ujc leu^jihs of tho two, we .may say, the length of the fliaf ^ti^k, the homonicul tliiig wjiich- w.e^ hi^v^ made .the unit of measurement, and i,mk aa-e homori, aad. as the length j(jf the second stick when com-p, (3"req with the flisl tii^miut be d,ispri,miuated from, it, we rauat iVom a mental

necegsit^caU it Qiffljjj^Ucj. Tlje Iqntgt^ ot the first stick and one are homon, th&lenjytth of ^^rsl stick: and th^tof the second are A^ommensm*a, therefore the lengthi* of af^coud.jskiud nud one ar,e commei);6ura; but oommensura* must oi iiec^sgity hay e a com lll1o:1 na live,, and henge.^he lej^h^h of<seeofid stick must t>e C!i||c4 ONE, liud Wd^4J3 iff s^pnd stick whpn n^>1, compared with another, and o:^ii ^ me hpmoD, Alivi if i^^ecpmibi^pithis. proposition, with the h^moni- cpT oije, which guyci UIti "U of measuvp}nept, we wiU hayje. length of first slick an J on is are homon^n, length of 8lbC>n^ stick and one are homon" therefore lengths c^r fir^l aqd .jjecondistic"s^"^rje commensur-a, since one and one (not twice olie) ai^c coffmciiliil^ura, tel : 4p4Jbt`pce the length of any stick whicii may bt aiUP"i one, will pe commefjsiaral tyrith the first tick. If how- e Vcr, the \ eng t Lt o f fi ivit, ojajkC t<2d.,and.^<3d, tli^n 1 st < 3d , and we ha f e

ihiree h("tcrica^ objects, which , ay e jnter; se^ incoiparaensura^ and we may con-
tin lie, ^yurijfia, 3d <4ih ^ Lherefore 1.8t<4itii,. hnj 4t 1<5|,h, tl^erfore 1st<5th, biit t5th;<6U1, tK`rjeipirc i`KOU^-apa thepefo^e 1st or.^^J`p^0roE tjhe objects af^r 1at,^j^ less 1U an g^i, *.ntl 50 /on, IJere. tiien we Iiavi3 -i^uc objects inter se incomminjuia, tjad a^ ihey aye sim^ilia i.n k^pd, each of them in; a like man-
er, hf^ been dififiTti-Qiitfateu ft'om othei\ things, and ^hey la^ave a>coffvmon

dis^inj`uish^ng^ tlicm trov^ulher thingadU^i kind; but this namt^does not dis-
llogniEh" them inter, ai:* ,,And if we i?anae theni l^t^ 2^, jSd, <fcQ,, t"ese dia-iot-
"mshin" terms merely tl[SuPguil`]i tljem Jiejt^ricaHy int^r se, but thpy do oot show the iacommentaial itlatiasA5-e^i^ttin^, among Ihepv, .'nd therefore by 
de u^e^uf ai^ch tei;Eny». we can i^ot^ sho;iv,;afy results fur1l^firrthan
heterical, which M^e may hare obi^intd. l^y coDtiparing tho^e objecjis /iQ^evse. There is jitb/^eptre, oaly on^ possible Wiyr fyr.\^ t(x foTO a language by wh#3e terms, w^pa:^'l^? P^IjIc to &how Uwx<: results of the minds colipf^risdns an^olig cem- niieuwura] and incimmtnngnraJ objects. A^ter that wej^ave gained, thtsi knowl' d(ze of the i"ojijunical thini^, which we esUblish, as the unit of measurement

in an homonlcal proposition, we niay apply this homonical unit to a second object, and if the homonical thing be measured just twice upon the second object, we may arbitrarily name twice one, two, and then twice one and two will always be in our minds commensura, and two will show the result of the comparison between any object named two, and tixe homonical thing called ONE. And by naming thrice one, three, four times one, four, and so on, we will hare the cardinal numbers applied to similia. One, tlicn, will be a common name for all objects, which are inter se similia and inter se com-

mensura; and so alsoVill 2, S, 4, &c. But 1, 3, 3, 4, &c., distinguish incomm-

mensura inter se, and show by the relations of the homon inter betera, the incommensural relations existing among similia. And these arbitrary signs of commensural and incommensural relations may be applied to any similia in nature, by taking an homonical simile as the unit of measurement; they may be applied to lengths, to heats, to colds, to weights, to volumes &c. It is \be peculiar perogative of mathematics to develop and carry out these principles.

But we must see that the unit of measurement, in all cases, is the pre-
dicate of an homonical proposition, and then commence commensural and incommensural propositions. And the syllogism with commensural and in-
commensural propositions, is used in every branch of mathematics from tl^e beginning to the end. And as the denionstrations, in mathematics depend upon definitions, it is necessary to consider the manner in which, we sylo-
gise upon those definitions. We have, heretofore said, that air definitions, which state directly what a thing is, are contained in homonical propositions; Ibis is the casxi in mathematics, and as geometry affords us sufficient illustration of our subject, we will confine our remarkes to it. Geometry, it needs not to be shown here, treats of relations in space, and hence a point is a position, a where in space, 1. e., a mathematical point and a where in space arfe homon. A line is the cause of consecutive points in space. A straight lineisthecourse of consecutive points in a uniform direction in space, i, e. a straight line and a course of consecutive points in a uniform direction in space are hoijaon. And again, the portion of space included betw66e^ two lines touching each other at a given point, and ah angle are homon. Again, the portion of space, which being included by two straight lines touching at a givjen point, which point being taken as a center and a circle described, is a quadrant of the circle, and a right angle are homon, and so on. All^ thp foregoing definitions, and all of the direct definitions upon which in geometry demonstration^ arc cobstructed, arc contained in homonical propositions. But When we say, an acute angle is an angle less than a right angle, wo do not directly define an acute angle, and therefore the proposition Is an inooBH^ naensural one, and so also when we say, an obtuse angle is i^reater thaa » right*nngle. And it must be observed that line is a C{»mmom name for simi-
genus of which straight line is a species; and so also with angles &c.

But alter the definitions in geometry, then follow what are called axioms. Those which are contained in commensural and in incommensural propositions, the bottom of which, as we have seen, is homon. But the commensural and incommensural propositions which contain axioms are founded on the syllogism. The axiom, that Things identical with each other, which are equal to the same thing, are equal to each other; is obviously the condensation of a syllogism into a commensural proposition. Let the length of a certain stick be the homonial unit of measurement and call this length due; one then will be a common name for all lengths commensurable with it. Now if we apply this stick to another, which is longer, we will say, A and B are commensurable; and if then we apply the first stick to a third one which we will call C, and find them to be commensurable, we will say, B and C are commensurable, B=C; then we have the syllogism A=B, B=C, therefore A=C.

And all the axioms of geometry are founded immediately upon the syllogistic process, though homon is at the bottom of the whole thing. If equals be added to equals, the sums will be equal, is very plainly founded on the syllogism. If A=B, as they are commensurable, we may call each of them three; and is A' = B', as they are commensurable, we may call each of them three; and if they are commensurable, A and B are commensurable and so also of B; and if we apply the unit to A', we will find that twice one and A' are commensurable and so also with A; and if we have the syllogism, A+A' = 5, B+B' = 5, therefore A=A' - B+B'. So also when we say that magnitudes, which being applied to each other coincide, throughout their whole extent, are equal, this axiom is founded upon the syllogism: and in this case we come 'closer to the homon at the bottom. Suppose we have before us a certain object called A, and another called B; it now we represent the magnitude of A by A, and that of B by B, we must then say, the magnitude of A and a are homon, and the magnitudes of B and b are homon; but if a and b cannot be discriminated otherwise than heterically, if they coincide, they are commensurable, a=b, and each fiftieth of it is called d. and we have m. of A=d, m. of B=d, therefore m. of A=m. of B. But if in the above case a and b can be incommensurated, there would have m. of A and a are homon, m. of B and b are homon; but a=b, therefore m. of A and a are homon, a=b, therefore m. of A<m. of B, but m. of B and b are homon, a=b, therefore m. of A<b; but m. of A and a are homon, m. of A<b, therefore m. of A<m. of B, which is the statement we have been led to by the syllogism, that The whole is greater than any of its parts. For, if aonj the whole lie represented by a, and the m. of any part be represented by b, then mv. of the whole and a are homon, m. of part and b are homon, but b<a, therefore etc.
glance. at the proposition will shd w us that ^t^is grammationy in the poten-
tial mode. And it must be evident tt^at t^ere are differentia^^^course, i. e.,
that a straight cotirs&uid a Qmh)ked-Qh4 - are diflfopentia, - tmd that two lines
one of Which runs a straight course and the other a crooked che, are in ca-
pacity . differentia ; fi\X\Ea a c$ir^\n nutnbpbr of. poip*is ifiji^e^^i^hat can run' through all of "tl^e ppints, and, .a line, . ; tha( ««ft f."^\B^ ^ijj?qflHhh,
q\br:4}{1\9=4f f
"elp, are mter, se differienUa. ; ;, ....^' . , . . .^..j <r,>;:u." - ,'r>.;:i
imil

* jf>..... : .^- 
\J \i. 'o:*; o

%et,*tii:^=bxr, p 0, be a str.al^t. y^f .^4,4ieI Ag^fii<B1 4^i»MWapa
course from A to C; then a straight lin^;^(4,4,^«i.h^«<~iBi: i^rt .*J RiIP
be another line, whose course from A to D, is represented by b, then A B D
and b are homon. Then if a ^R^j6ef',h<[^[fii], or similia, ABC and A B D
will be similia. But the c'l re urn stantie ihut tktTi l>y^ut at l> in b can be dia-
CRMinated from anj^ pont io the^ course a, atiiii that at A, and }^, a b co-
aricdbi'te^fetftMtWf C0maes A and b are DMjreutia. Thai tire cupicity of
1h<line'-A'Jsv^rifffdfA^are lolume, arid the'cap*r*city of ide line A B D Xnd b
api1\wL1U(tilA4)diijk:'feha B are dififeleotfli~ therefore we Bay",^ capacity of
liilift A.
B'OftM ijl\fr«i>l«f*«Eott\',*k\ant! b are diiferentia, lht*renrne/repACity of liae ,A B
OkBd'':ixM^M^d)fm>edti]Yl; but' capacity of J iuc A'Bi> and b tire bpm<. cap'acfty
ef liri*»Afl(J'*nd B'tttt'\'difereretitlas tbcoreeef''ABit'faihb ABD arfeWIrFJ/eolii;,
A
BG!h>()»W5ivei^,*by hy^r^rttttiesis, Is a straight iiitio/ththerefore A B D is dot'i

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tlf:iw8ef U»4w4wW^ thepi^pioaUioiiiii tliiftt two stnaghr tiast caniistineliiMe
.*fxIM5^J\l.i=x^ftWQftti^ecte^lii\);*j^j sttirrwldDQd by comecaUTe points"
imAiv ir/iitary<9ir4re,oil*\xM:Alightfii11Q1'i'tfoaUKdr strai^kt Uaa toaokingthe fttrs^ 
fWe4n1iWjitKx"pg\xtom>W\fn^"Y'rg"U*m it\'but mUtoalncide WHb Iftlia its 
;1R^".ApiMr^4Mb1k <-lirAeii>"<x9rat\AforM4iiii<ctioa.ckilaiioloM noting.
.; u r/jiFO/b*T9,"<P\Hw!wplwp%ir,\W\\WgbwAox>Jo\w1hlfttttb^ 
jpl1^\)lyreJfiriAu^]}.^9Qx(9^|lJiolog19^^ AA<i\tiny«mug the axioms therefiMre, we
iwW/SlTyl:Oi^ jyUis^oa <9f the jwiAcuiOts of Qur ^ysteovof raaoapoing itom a
figiftta pr^podUiiHi t^ geoirjir. . Take jh»« profK)aitio& ^lat 1Ue sum of diQ
aiy^i^ Qf 4)M*Mq1LQ."re eq?ial tf».tWQ i;ijrila a^v

- ' ^ Lit D E be thto Itiangle add prbloni: the side DImo i.; and from the
peims draw SB pkralllei tb tic, then TVbm t)revioi18 i/Jloglsmfl we know
that the angles ODL aid BEAare commensura; We aUo that the angles OEB
and DCE art commensura. But ab CDE and BEA. are commensura, we may
call thaoFbJ the common name A; and as CEB and DCE are commensura,
we May call them by the common name B; Then either CDE or AEB is an
A, and either CEB or DCE is a B; and we may call CED, C; then AB
and C and the sum of the angles of the triangle are commensura. But the
sum of all the angles that can be formed at a given point on one side of a straight line and two right angles are commensurable, the angles A and B and C are HM^10ttkOf ihl^aaglet b6 tot^itd at the point E, therefore A, Band C together, knnt t^ Hghl^ahgM itt^ cdMmehsiira.

OftAFTER XX.

^KHYICKHB, SOBITBS AND DEL^SMK.

. ', ^ f{ayin}^ expli^n^ed, W ;tha.previsoas chapters ^he. op^ioofiii^ whipk the s|lo|i^ic process pf^Q^ e'(. f (jo)^^ 4een^ J',j^i|al|aary; tioll elfibpr' mach - - **-^j EAtytmtmsv8<^rjit^s Of jPpJj^mpja. Wkeu eitkej- ,<wie o( .ti^A.ppwlMs

^V^*^^^^?@^^^??*^^^? thp,plfU^rViixi*sr#tooa,/thfl 9XiMressii4 ftrwalie

Now when a conclusion has been legitimately drawn from premises, this eHiGlasl(Mi may be mad a premise and combined with either of the fOr- ttor-icrcaisos, and another oonnsion may then be drawn; and then this Tat- ter coliclasion may becombined as a premise with the first knnd so on. WhOQ weoonHne tosyllogiee in this manner, the chain Of syllog^isms is c<Me<^ 8«<^rHes; as, A and B are similia, B and O are sim^ia, therefbre A and Giff^Plmftia; but and D are similia, therefore A and D are smilia; but D and B are simifia, et6j And this process may be pursned With any of the modes and figures, which we have given in the pr^sCtedfng paradigms. Thus: A and B are similia, B and are differitia, therefbre A and O are differenia; but B and O are similia, therefore A and D are differ^ntia; but D and £ are differienta, therefore A and E are differentina x>t similia etc. Now we stated in a previous chapter 'that there are flye objective' nonrinal truths, and if we let A stand for one of them, B for another and C, D and £ for the others severally, we may syllogize upon them in the following man- ner: A and B are hetera, B and O are hetera, therefore A and C are hetera; bate and Dare hetera, therefore A and D are hetera^ but D and £ are hetera, therefore A and E are hetera; and therefbre A, 1. e., the thing distin- guished by the name A, and taste, or sound, or feeling, or color^ or scdnt^are homon. And this shows us the manner in which we come to use disjunctive propositions; they art conclusions of syllogisms. The sily is either clear or cloudy, why? There are two states, capacial gregaria, of the atmosphere,
distinguished inter se by the names clear and cloudy; one of these states may be clear or cloudy, i.e., the present state of the atmosphere and either clear or cloudy are homon. And when we say that Men are either black or white or of any; this is a conclusional proposition drawn in the same manner as the one above; though there might be men of neither of these complexions, for aught we know. And in the conclusional proposition just given, what is really affirmed is that one of the facial gre-garias of every man and one of the three colors namely, black, white or tawny, are similia And as similia have the same name the color of any man and blaek or white or tawny are homon. Again; iron and glass are hetera, hetera are divided into two classes, namely, similia aid differ^tia, therefore- iron kind glass are either similia or differentiae.

Newly the combination of disjunctive conclusional tirobp^ititifis' In p ii e iiiaD, we forto the basis of what is called the 'f>i<i>f'hima; thus. A'mit

A^m t\X\FAT ^or QjBLV^simiUs^ we mean tUAt^ aud^onjefoj jUii#i9w,#e)si simi-

li a, while A and the other may be differentia forA''r^iti^ i^i^closed hf .i)f

prQjppa^tioa; ri^ile in tb^e ifU.ter: lo^taace, 0iU'er, B*or C a'' J'w^a aoililia, ^

jpfift ijitt^jvB^a(i .D ajre aip(iilia,^ixc) ajlap t^j^G ao4 D -afAfimma^ .AocJ-il

t'^is, ^bigjii^iy, m ,l^4:196 x)f, tb.e cpri-ellatiyes, , tUatiin^i^i^l

U.euii^avt^jimic of y>p bj vxj^h. ^vez are Ga«x^ re- aware o (.H,

A\^ t\X\FAT ^or QjBLV^simiUs^ we mean tUAt^ aud^onjefoj jUii#i9w,#e)si simi-

li a, while A and the other may be differentia forA''r^iti^ i^i^closed hf .i)f

prQjppa^tioa; ri^ile in tb^e ifU.ter: lo^taace, 0iU'er, B*or C a'' J'w^a aoililia, ^

jpfift ijitt^jvB^a(i .D ajre aip(iilia,^ixc) ajlap t^j^G ao4 D -afAfimma^ .AocJ-il

t'^is, ^bigjii^iy, m ,l^4:196 x)f, tb.e cpri-ellatiyes, , tUatiin^i^i^l

U.euii^avt^jimic of y>p bj vxj^h. ^vez are Ga«x^ re- aware o (.H,
the enthymeme is state^, g" qat^grpieaUyi. ta s^jgw bhatibe eo^ollttton
^^^fifftSttyftp^'V logically t but ^Iso.thHt tUa .lurpipAiw^, frc^ m^ch the
s^p^cjjiiajipaia d/;aw^?^e aptual, ,Tixtts if A aft4 ft ape siwluUa itban,A mAf
.a^H'oiiii;~ but A ^u,d.B ar^.^jmilia^ thf?iefo/e a an^ ip^tte-aiwiUa . i
laifflifi
^^^f%i^ «<<^<P<^pi"i'^WfW^5(ad by jTe»WP0|Kw", As-luH^i^it. all d^pewi
"W^tf^P exbreseluo.u> if 4, ap4 * "' sip^ jU^, . th< A.ftpd. G,aix« ^iiiaiAy
ti»Ut
up9<^,A.^ B are siqxilia ,au^ auaii^ pr^aiais$< lyadiwatc^di {a ttM* 491)0^
tions, and it arises upon the erroneous notions enitit Lained by HambUim and
others respecting predication. Suppose in the above example given, we
leave the if and then out, we will then leave, thesesin new, it is day: Kuw
Mr. Hamilton would admit that there are two propositions, bill would answer
that kilhioigh there are two, yet it is not shown in any way Ulat the one Is
connected to or depending upon the other without the words if and then.

Very well; take the propositions A ik B, C is B, A is C, and utuiUiuU ihu word
THBRRKFORE, before the last one, it is not shown by words, tuit this'lshe con-
cclusion of a syllogism. And if the words if jtnif tjjf:n [0Mi;e3s the magic
power to merge two propositions into one, we ma^- use them also to merge a
syllogism into a proposition, thus; if A is B and C id B then A is C, which
according to Mr. Hamilton Would be merely a]yp<^Hu.Tit^ii pl(oju)>iiiijob.
For when we say if A is B tthd C is B, we expe(,t siiijutiilitig h> ri>JLLivvv an

"we perceive that A is C, does follow, and hence we may re^ard all this as but
opQ coDtiQuous act of the mind. And respecting the expression "if A is,
then B is^ or A is through B," this expression is not true in any case except-
ing when A is and always accompanied by the effect B. Mr. Ham-
ilton's erroneous notions of what he calls an hypothetical proposition led
him. to misunderslood entirely, wlvat he calls an hypothetical syllogism. On
page 346, following Esser, Hamilton says, "If however, an hypothetical pro-
position involve only the thought of a single antecedent and of a single
consequent, it will follow that any hypothetical syllogism consists not of
more than three, but of less than three capital notions; and," in a rigorous
sensej^his is actually the case. On this ground, some logicians of great
acuteness have viewed the hypothetical syllogism as a syllogism of two terms?
and of two propositions, l^his is, however, error^eous ; for in an hypothetical 1
Syllogism, there are three ALLt three terms. That under this form of rea-
oning, a whole sylHogism can be envolved out of not more than two capital '
notions, depends en this, that the two constituent notions of an hypothetical
i^yllogism present a character in the suportion altogether different from what
th^y exhibit in the subsumption and conclusion. In the suportion these no-
tions stand in the relation of reason and consequent, without
however, any determination in regard to the realit/or unreality of one or the
other - if one be, the other is^ is all that is enounced. In the subsumption, on
the other hand, the existsincf^ or non-ex.stance of what one or the other of
these nollosD com prides is expressly asserted and thus the concept, expressly
affirmed oT exptraaT deniuJ, manifestly obtains, in the subsumption, a wholly
difereQt sigulicauce from wbat it bore when only enounced as a condition
of reality, or unreality, and in like manner, thit notion which the subsum-
ption left untouched, and concerning whose existence or non existence the'
cooelu^ioQ decides, obtains a character altogether different lu the end from
what it presented in the beg-in ning." This explanation Hiimlton obtained
from Esser. And hence fimii the above reasoning,, if we suppose that we
have bdbre us rt hal and a broom (which very supposition implys two sepa-
rate exlstenttes) and we stiy, if the hat is not the broom, the hat and broom are
are separate exsteaccf*, but the hat is not the broom, therefore the two are
separate exsistence, we makti a suportion to get at some virtCal third term,
and thia third term is envolved, because the terms in the suportion stand to-
gether in lh(^ reiuiion of reason and consequent, and in the subsumption they
they are asserted to be realitiesi^ and hence; the, third term; then in! the sub-
sumpton"w.e take the suportion to be actual and real, and by fllis method of
syllogising, wc wrote that the hat is not tluj broom, just as We supposed in
th^ suportion, h is astonishing that a man of so great learning and natural
ability'aa namlloo should have b^cn drawn into tjiillis subtle and trifling
nonfienpe of the German. Iji what Hamilton. cajjs Dilert"^led iuclgments,
he a^d Whatley are also in the dark. Hamilton s^s (on g. 170) "Dilemmatic
judgments are those, in which a condition is found, bold in the subject and in the predicate, and then a combination of an hypothetical form and of a different form, they may also appropriately be denominated Hypothetical-di-unclivo. If x is A, it (x) is either B or (if an action be prohibited, it is prohibited et t terminator by natural or by positive law.* * * * * Now I tipprehend, it will be impossible for any one to see why x is either B or C, gnawing that x is A, without gone through the process — A is either B or C, x is A, and therefore x is either B or C. Hamilton carries his errors respecting Dilemmatic propositions into what he calls Dilemmatic Syllogisms; but we will not criticise further.

CHAPTER XXI.

THE SINGLE HOMONICAL SYLLOGISM.

Having treated of the Singular Syllogism and having explained pretty thoroughly the manner of the syllogistic process in the mind, it yet remains for us to show the further application of this process in the acquisition of knowledge. We have already shown that from the combination of two homonical propositions, as premises, we may gain similia or commequa in the conclusion. A. If we represent aggregate existences by B, C, D E &c., and any simple existence by A, we may then form an indefinite number of homonical propositions, all of which shall have A as the predicate, thus:

\[ \text{Gregarium of } B \text{ and } A \text{ are homon,} \]
\[ \text{Therefore similia of } C \text{ and } A \text{ are homon.} \]
\[ \text{Therefore similia of } D \text{ and } A \text{ are homon;} \]
\[ \text{Therefore similia of } E \text{ and } A \text{ are homon.} \]

And so on; i.e., which 'l&9. continued syllogism or Sorites. And a mere glance at the above chain of syllogisms will show us that, the simile A, exists in B, C, D, E, &c.; and if B, 0, D, E, &c, each points out an individual object, a swan, for instance, and stand for white, for instance, we would say that Sw"n B, Sw"n C, Swai? E, and all "wans which we have seen, are white; they are all similia in the face of the experience. A 2 by, this aid v1 conversation and books, we can of course, use the experience of others in the same manner as our own. Ami"f from this experimentation we make an experience of the experience, this process which is wholly syllogistic within experience but no further, have been called by Bacon, "induclio per enumerationem sui plceu, ub; non reperi

But if everetru to the nominal irquet's spofceo of at "he beginning of our inquiries, . any person will re?idely admit tiu" all colors, not only ihon"j", which have been seen, but also those which can be seen, ^ire visible, i.e., visibility finif. .siae qu' no' qf cplors arv* Uon'on Color, however. Is not an "g"fii5. "b" simple .existence and therefore, not one of the colors, imi oop itself and visibility are objectively homon, And an objective homon, however often its times can be heterated, is nevertheless always, l"o-moil<; time in" ltd modificattonof p<zist, present und Ait^re, cannot strengthen our belief in i. homon. If I take a marble and inclose it i lii') hand for four hours, when I irst put it into my h'aud i believe it to be ap lio-
monical thingt end at the end . of fourciA^oui's I belijeye it tio b^ (he homonical things witi^out doubt; the mi4y thing, thstoafl make me do\ibt of ao objective homon, is that I do not a^ Ways feel certain that^Jn the^ course (xf time, the homopio^l thing m^y i^ot l^aye been removed an,d a simple ,huve been put into its place. The heteratioD of an objects times can havei.nu heteratiug eflEect upon the object itself. The power of the mind to heterate, i b deed j depends

upon time and space; but mspjBpticg the ego per se and the nan ego per se, homon is homon irrespective of. time. And hence if we take an object as time can have no heterating effect upon itj a thousand years from to-da)'', it will be homon ;. and although time has be^n personified and endowed witli capacial gregaria by the poet«, it must be evident that^time per se has noth- in it, to produce any effect upon the ego or non-ego. But as time has no . capacity to heterate or differentiate objects, if we afllirm that this where is a where of pure space, i. e., this where and one whereof pure space are homon, and that where and a where ot pure space are homon, it must follow that this where and that where are similia. If time per se can neither heterate n«r differentiate, %uy two wheres of pure space are now, always have been, .and always will be, Similia, so long as pure space and pure space are homon ; and so also with every other object so far as time per se is concerned.

But we may ask ourselves, has space any capacial gregaria to affect objects occupying it? And by the artificial production of a vacumm, we are able to decide tipon reflection that here, in this instance, is a space, which ha» bo capaciity to interfere in any manner with objects occupying it, were an'y object in it. But if h^mon is homon, if space is space, this particular Ykcuated space and dny other where of pure space are similia, they cannot be differentia, and hence no space can heterate, differentiate or inftommensurale objects occupying it. W^ have therefore eliniinated time and space, as agents, from our consideration; but befote proceeding farther, we must explain some terms, which we will have occasion to use hereafter.

If we take any homon, this homon t6-day, will be homon a thousand years hence, so far as time and ^{mCe are concerned, W^ WHI, therefore, call this homon an bombhical homon. But if We take another homon, a like case will be vdth it, and to distinguish the second homon from the first, we will call it an heterical homfln ; ab homionical homon knx\ an heterical homon will then be hetera. * -

Again; If the homon ical hombn and 'th^ heterical homon be in tcf se similia, we may call the heterical homon with refereno6^ to th6 homonical homeh, a similical homOn. An h^morfickl *iit)mon and a feinilical homon will then be similia. ' . / ' •• • ; ' • : 

, Again; K theixomonijcal iKwion aa<^ .the ii^Ksrioal homon bo iaterse differctia, we may call the heterical homon with reference to the homonical homon, a differential homon. An homonical ['lou^on and a differential homon wiltrhen be differetia. ' - ■

"Agiai?B; If the homonical homon and tha rhetorical homon be oommeo- «n4*a, ^Yft may callAhe heterictcttl i^omon ^ coramenaual homon. An Jiomoni- cal bemon and ^ commensurale homou will theii be commensura.

But again;; If, the homonicial homon arret the heterical h^mod be in- commmensura, we" 'may call the heterical homon,* an incommensural homon.
An homonical honton and an incommensural homon^Q^lihen be in-
^eommeoffurav.; » .

M5

The folUwing list will snow the terms ajid lb« manner in wliicli tbey
distinguish objects:

i
Homonical homon - a I u^^,'/,,

o
Homonical homon - a K ^._

Heterical homoo- b

f'

Qj Homonical homon - a J „]«,tK-

Similical homon-a' P^o%^^"-

Homonical homon-a [^ir ^^",s^

zsfdiff,

Differentia) homon

K, Homonical homon - « f «^«,«,^««««.
5th. ri. ^«..««i i,.«v o, hcommensura,

Commensural homon-

?!•

i... Homonical homon - 2 ) :"«",,,^"...,

^\- Incommensural hemon-3 f ^"commensura.

Now with the above terms, the following syllogisms which we call
singular homonical syllogisms, because one premise at least in eilch mode is
hnonional, may be constructed:
MODE 18T.

The homonical homon a, in the plane-B to-day, and the homonical homon – a, in any where a thousand years hence, are homon.

The homonal homon – a', in the plane-c today, and the homonal homon – a', a thousand y'jars hence in any where are homon.

Therefore the homfical homon – a, in any where aUiousand years hence, and the homonal homon a', in any where a thousand yeani beitde, ate similia,

MODE 2d.

The homonal homon— a, in the where b, toMlay, 4^ud the homonal liroon – A, in any where a thousand years hence, are hon^i).

The homonal homon – a, in the where, b to-day, and the heterlclf homon c, in the where – D to-day, are hetera

Therefore the homonal homon- a, in any where a tbou^aj;id y^4J^ hence, and the heterical homon a in any where a thousand years hcfH^ are hetera.

MODê 3d.

.The homonical homop a in the where b to-daj, and the homonal hi)-
mon A in any where, a thousand years hence are homon.

The homon cal homon a in the where b to-day, and the similical ho-
mon a' in the where c to day are similia.

Therefore, the homonal homon a in any where a thousand yefiri| hence, and the similical homon a' in any where a thousand years hence, are similia,

mode 4th.

The homonal homen a in the where b to-day, and jj^h^dnicJti homou A in any where a thousand years hence are homon.

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'->: The^homowical homoD A in the where b to-day, and the diff^'ential homon c in the where d to-day are differentia.

Therefore the homon ical homon a in any where a thousand years hence, and the differe»tial homon c in any where ft theotrsand years hence are differentia.

MODE 5 .'H.

The homwnical homon a in the where b today, and the homon ical ho-
mon A in any where a thousand years hence are homon.

The npmonical homon a in tiie wheell b to-day and the commensural
homon a' in the where c to-day, are commensura.

Therefore the homonical homon a in any where a thousand years hence and the commensural homon a' in any whe^e a thousand years hence are commensura.'

After a careful study of the/ above mbde iti the singular homonical sgrttogisDit Ike foHowibg reasoning, we > beliyet will appear obviousw If we let a homon, always be homon in our minds, and we make this homon a SIMILE, i. e., it the homon a in the where b, have a simile in the where c, and anoth^ iti tb^Vhht'e B-ahd so oh, each one of these similia must have a com-
mon name, and no*lttat<er if their hieterJcal ndihber be infinite and the points of time of somci<e'in thfe past, of others in the present, and of still others in the future, yet we have no hesitation if believing that each one must be an a. fotlf ft" «Witild nt6the so, homon would not be hotnon; and that the really saitle thfttgihouWiilot be the same thing \h abststrd and iniposssble. But the homon in our minds has a simile ip the minds of other men, and henc6 we believe without a. doubt that two beings like ourselves a thousand years hence all' colors, which 'they willknow any thing about, will be visible, i. e., color an^ visibility wijl be to them homon. The same thing is the same, thing, iiomoh is homon, no matter about the modifications of time and space. Color aid visibility are homon, visibility and visibility are homon. Therefore, toioT arid' visibility are simiiia (mode 1st) as the must be, if the visibility, in the flfi'st premise and that in the second be objectively hetera; and two ob-
jectively hetherical existences, one in, laborach premise, must always be found in the pr,emi;e* e8 of oye;ry syllogism. Ad4 hence the general propesiti<An that all colors are visible, is eslabishedi beyond a doubt ^y ili(^ syllogistic process.

The propostioo that all sounds i^'e audible, or that sound will be audible, is (established,. in the same mauuer- ^And thus y^i^ m^y deal with all the homouical propQsMious iu wjiich both the subject ^n4 pre-
dicate are the simple el^istauctss, which w< have called tac^al, g^p^ariiv That all red is red, that aji sweet is sweet, or that all white is, bas buen, ari?4,«v<r will DC white to human beings, nobody doubts, because a contrjiry sopposi-
tion is not only incouemivable but impossible, unless similia ai;id dif^f^ntia are homon. ^, ^ .

Let us now li^n our attention to capacial gregaria, and we wilj, flfist notice figure or form. It is a proposition not worth disc.usssing after what has already been said respjictui homonical propositions, am), space, rtllai every a"ggregate existence must have some figure or .form. 'Bu'; -\^erc ten millions of forms inter se differentia koQwn-to our minds (and about thiipgg unknown we caunot reason) and we should give a name to distinguish aqy one figure or form, each other figure, which was a simile of the figure oumed
And it must be evident that if in any relation of parts, a quality may be called a quality, be found in any figure, this quality must be a simile in any other figure, which is a simile of the first, and so always. Therefore second round ring and a (one) circle are homon. And also with squares, cubes, triangles, parallelograms, &c.

But if we consider the forms of animals, vegetables, or minerals, we will find but few perfectly similia. The human form, no homonal type by which to determine similia. If we should give definite relations of points in space as the human form, we might properly say that any human form is approximately true when applied actually to individuals. For the homonal standard which we have assumed, has not a simile in each individual of mankind; yet there is an approximation to similia in the forms of human beings sufficient usually to distinguish the human form from other animals. And this sufficient approximation to an homonal standard in one, and the approximation to an homonal standard in another, enable us to affirm differentia anywhere, now, in time past, and in the future. We may say with all confidence that the form of any man and the form of any lizard have been and always will be differentia. The human form, though not a simile of any homonal standard, is sufficiently distinguished by its relations from others; and were it not so, we could not tell the human form from others. We can not, indeed, point out any particular in the form of John, and say that wherever man is found, you will find a simile of this particular, but we can point out a number of particulars in John and say with confidence that wherever man is man there will be an approximation to these particulars. Of the forms of animals, vegetables and minerals then, we can not usually find an homonal type, and hence we can draw but approximate conclusions respecting the individuals which we have not seen.

Let us next consider impenetrability. We say and believe that all matter is impenetrable; and impenetrability being a simple existence and the
predicate of an homonical proposition whose subject is an aggregate existence, we mean of course, that one of the gre^aria sine qua non of matter andimpenitratability are homon; And why do we believe this? Simply b^cause we believe that homon is homon in any where at any time. Take the proposition All matter occupies space; and if this needs proof, we may take any piece of matter and we w^ill see that this piece occupies space; we will see also that a where occupied and a where unoccupied are differentia; then the "where of this piece of matter and an occupied where where are homon; an okscupe where and an occupied where e are differentia; but if another piece of matter can exist in an unoccupied where, then the where of the first piece and the where of the second one are differentia. But all unoccupied wheres inspaeere similia, because space is space, hopion is homon; t,he capacity to ooCuuy, therefore in any wher^, is the only thing that can make an occupied where and an unoccupied where, differentia. But this capacial gregarium must reside in the thing occupying, and therefore matter, having this gregarium and matter without it are differentia. But matter is matter, homou is homon, and this oapaeim gregarium is the sine qua non, which makes different pieces of matter siinilia, and therefore all matter must occupy space. Impenitrability in objects is nothing more than the capacity to remain in tp^ee; for, so long as ah homonial object remains in space, the homonical where, in l7hf^ it is, cannot be occupied by an heterical object, unless hetera and homon are homon, which^ impossible. So long therefore, as matter is

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matter, impenitrability will be its capacial gregarlum. That, which has bo where, cannot be matter, and hence matter, whose impenitrability has been destroyed, is no longer matter, it is no longer anything. The homonial where of an homonial existence called matter land ah (one) occupied where are homon, an occupied where and an unoccupied whdre are dilS^erentia; but if the homonial matter in the homonical where be destroyed by heterical matter, the honr6ncal where cannot be occupied by the homonical matter unless hetera and homon are homon, which is impossible ; therefore any matter must occupy space. This, however^ does not proye that matter cannot^be annihilated; it only proves that wherever and whenever^ matter is matter^it will occupy space ; that all matter is impenitrable. Whether matter oaa be aonihilatid or not, we have no data from which we can decide the question. Water may be inclosed in a golden ball and pressed through the gokl^ but this only proves that by such means matter cannot be annihilated.

The use of the syllogistic process in establishing a sine qua non, by the SINGULAR HOMONICAL SYLLOGISM, which we have just been discussing, seems to be what J. Stuart Mill considers the true type of induction, when he defines induction to be "the operation of discovering and proving general propositions," Mr. Mill, however, like all other writers upon induction, seems to have had no definite conception of the thing for which he was on the look-out, and he would not have been able to have identified it, if he had found it. In one place induction is "the operation of discovering and proving gener^ propositions ;" in an other it is "generalization from experience ;" in an other it is "thatoperation of the mind by which we infer that—what we know to be true in a particular case or cases, will be true in all cases which resemble the former in certain assignable respects ;" and again, "to ascertain what are the laws of* causation which exist in nature ; to determine the effects of every cause, and the causes of all effects, 's the main business at induction; and to point out how this is done is the chief object of inductive logic."
Mr. Mill is an able writer, but his logical induction is, in a great measure, an ignus fatuus.
CHAPTER XXII.

THE PLURAL HOMONICAL SYLLOGISM.

Having shown in the last chapter how we generalize from experience, and also how in certain cases we may select a simple homonical existence and prove it to be a sine qua non by the singular homonaical syllogism, we must pursue the syllogistic process still further and show how we reason by the Plural Homonalical Syllogism. If we put two balls before us, we will say that they are hetera, i. e., that the one is not the other; if, however, we turn our eyes away from them for a few moments, or cover them with our hand, and then we remove it from them and look at them again, we will say that they are the same balls. But by this expression we do not mean that the one and the other are homon, for we know that inter se they are hetera, but what we really mean, is, that the two balls under our eyes then are the identical balls under our eyes now, i. e., the two balls then and the two balls now are homonalical hetera. And before proceeding further, we must again explain some terms, which we will have occasion to use in our future Inquiries.

We have already seen that time and space per se have no capacity to heterate, differentiate or incommensurate objects in time and space, that subjectively two, but objectively one homonalical ball te day, so far as time and space per se are concerned, will be objectively homon, to-morrow and forever; we will therefore call such homa, homonalical homa. But it we take subjectively two other balls, which are objectively homonalical, they are related to themselves in like manner as the first two, we will call them heterical homa: Homonalical homa and heterical homa will then be hetera.

Again, If two homonalical hetera be inter se hetera to-day, so far as time and space are concerned, they will remain hetera, and therefore we will call them homonalical hetera; but if we take two other hetera, they also will remain hetera, and to distinguish them from the first two, we will call them heterical hetera: Homonalical hetera and heterical hetera will then be hetera.

Again, If two homonalical hetera be inter se similia to-day, so far as time and space are concerned, they will remain similia inter se, and therefore we will call them homonalical similia; but if we take two other hetera inter se similia, they also will remain inter se similia, and to distinguish them from the first two, we will call them heterical similia: Homonalical similia and heterical similia will then be hetera.

Again, If two homonalical hetera be inter se differentia, they will remain differentia, and we will call them homonalical differentia; but if we take two other hetera inter se differentia, they also will remain differentia, and to distinguish them from the first two, we will call them heterical differentia: Homonalical differentia and heterical differentia will then be hetera.
Again, if we take two homonical hetera inter se incommensura, they will remain incommensura, and we will call them homonical incommensura; but if we take two other hetera inter se incommensura, a like case will be with them, and to distinguish them from the first two, we will call them heterical incommensura; homonical incommensura and heterical incommensura will then be hetera.

Again, if we take two hetera inter se similia, they will remain inter se similia, and we will call them homonical similia; but if now we take two heterical similia, and the homonical similia and heterical similia be inter se similia, to distinguish the heterical similia, we will call them simical similia: homonical similia and simical similia will then be similia.

Again, if we take two homonical similia and two heterical similia, and the homonical similia and heterical similia be inter se differentia, we will call the latter differential similia: homonical similia and differential similia will then be differentia.

Again, if we take two homonical differentia and two heterical differentia, and the homonical differentia and heterical differentia be inter se differentia, we will call such heterical differentia, differential differentia: homonical differentia and differential differentia will then be differentia.

Again, if we take two homonical commensura and two heterical commensura, and they be inter se commensura, we will call the latter commensura, commensural commensura: homonical commensura and commensural commensura will then be commensura.

Again, if we take two homonical commensura and two heterical commensura, and they be inter se incommensura, we will call the latter, incommensural commensura: homonical commensura and incommensural commensura will then be incommensura.

Again, if we take two homonical incommensura and two heterical incommensura, and the one of the homonical incommensura and one of the heterical incommensura be inter se commensura, and the other of the homonical incommensura and the other of the heterical incommensura be inter se commensura, we will call the heterical incommensura, commensural incommensura: homonical incommensura and commensural incommensura will then be commensura.

Again, if we take two homonical incommensura and two heterical incommensura, and they be inter se incommensura, we will call the latter, incommensural incommensura: homonical incommensura and incommensural incommensura will then be incommensura.
Now the following paragraphs will show the syllogisms, which may be constructed with the foregoing terms, which syllogisms, as they have one homonical premise at least in each mode, we call plural homonical syllogisms.

Mode First. — The homonical homa a.a. to-day, and the homonical homa a', a thousand years hence, are homonical homa; The homonical a' a' to-day, and the homonical homa a'. a' a thousand years hence are homatical homa; Therefore the homonical homa a.a. a thousand years hence and the heterical homa a. 'a.' a thousand years hence, are similical homa.

Mode Second — The homonical homa a.a. to-day, and the homonical homa a.a. a thousand years hence, are homatical homa; The heterical homa a. 'a.' to-day, and the homonical homa a.a. to-day, are heterical homa; Therefore, the homonical homa a.a. a thousand years hence, and the heterical homa a. 'a.' a thousand years hence, are heterical homa.

Mode Third. — The homonical hetera a. 'a to-day, and the homonical hetera a. 'a. a thousand years hence, are homatical hetera; The homonical hetera a. 'a. to-day, and the hometical hetera b.b. to-day, are heterical hetera; Therefore, the homonical hetera a. 'a. a thousand years hence, and the heterical hetera b.b. a thousand years hence, are heterical hetera.

Mode Fourth. — The homonical similia a.k to-day, and the homonical similia a.a. a thousand years hence, are homatical similia; The homonical similia a.a. a thousand years hence, and the heterical similia a.'a.' to-day, are heterical similia; Therefore the homonical similia a.a. a thousand years hence, and the heterical similia a.'a.' a thousand years hence are heterical similia.
Mode Fifth.— The homonical differentia a.b. to-day, and the homonical differentia a.b. a thousand years hence are homonical differentia; The homonical differentia a.b. to-day, and the heterical differentia c.d. to-day are heterical differentia; Therefore the homonical differentia a.b. a thousand years hence, and the heterical differentia c.d. a thousand years hence, are heterical differentia. 

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Mode Sixth.— The homonical commensura 2.2. to-day, and the homonical commensura 2.2. a thousand years hence, are homonical commensura; The homonical commensura 2.2. to-day, and the heterical commensura 3.3. to-day are heterical commensura; Therefore the homonical commensura 2.2. a thousand years hence, and the heterical commensura 3.3. a thousand years hence, are heterical commensura.

Mode Seventh.— The homonical incommensura 2.3. to-day, and the homonical incommensura 2.3. a thousand years hence are homonical incommensura; The homonical incommensura 2.3. to-day, and the heterical incommensura 4.5. to-day are heterical incommensura; Therefore the homonical incommensura 2.3. a thousand years hence, and the heterical incommensura 4.5. a thousand years hence, are heterical incommensura.

Mode Eighth.— The homonical similia a.a. to-day, and the homonical similia a.a. a thousand years hence are homonical similia; The similical similia a.a. to-day, and the homonical similia a.a. to-day are similical similia; Therefore the homonical similia a.a. a thousand years hence, and the similical similia a.a. a thousand years hence are similical similia.

Mode Ninth.— The homonical similia a.a. to-day, and the homonical similia a.a. a thousand years hence are homonical similia; The limonical similia a.a. to-day, and the differential similia b.b. to-day, are differential similia; Therefore the homonical similia a.a. a thousand years hence, and the differential similia b.b. a thousand years hence, are differential similia.

Mode Tenth.— The homonical differentia a.b. to-day and the homonical differentia a.b. a thousand years hence are homonical differentia; The homonical differentia a.b. to-day, and the similical differentia a.b. to-day are similical differentia; Therefore the homonical differentia a.b. a thousand years hence, and the similical differentia a.b. a thousand years hence are similical differentia.

Mode Eleventh.— The homonical differentia a.b. to-day, and the homonical differentia a.b. a thousand years hence are homonical differentia; The differential differentia e.d. to-day, and the limonical differentia a.b. to-day are differential differentia; Therefore the differential differentia e.d. a thousand years hence, and the homonical differentia a.b. a thousand years hence are differential differentia.

Mode Twelfth.— The homonical commensura a 2.2. to-day, and the homonical commensura 2.2. a thousand years hence, are homonical commensura; The commensural commensura 2. 2.' to-day, and the homonical commensura 2.2. to-day, are commensural commensura; Therefore the commensural commensura 2.2. to-day, and the homonical commensura 2.2. a thousand years hence, are commensural commensura.
Mode Thirteenth. — The homonial commensura 2,2. to-day, and the homonial commensura 2.2. a thousand years hence are homonial commensura; The incommensural commensura 3.3. to-day, and the homonial commensura 2.2. to-day, are incommensural commensura; Therefore the incommensural commensura, 3.3. a thousand years hence, and the homonial commensura 2.2. a thousand years hence, are incommensural commensura.

Mode Fourteenth.— The homonial incommensura 2.3. to-day, and the homonial incommensura 2.3. a thousand years hence, are homonial incommensura; The commensural incommensura 2.3. to-day, and the homonial incommensura 2.3. to-day, are commensural incommensura; Therefore the commensural incommensura 2.3. a thousand years hence, and the homonial incommensura 2.3. a thousand years hence, are commensural incommensura.

Mode Fifteenth. — The homonial incommensura 2.3. to-day, and the homonial incommensura 2.3. a thousand years hence, are homonial incommensura; The incommensural incommensura 5.6. to-day, and the homonial incommensura 2.3. to-day, are incommensural incommensura; Therefore the incommensural incommensura 5.6. a thousand years hence, and the homonial incommensura 2.3. a thousand years hence, are incommensural incommensura.

If the reader has carefully studied what we have called the singular homonial syllogism in the proceeding chapter, the plural homonial syllogism will not need to be specifically explained. And any person can see that we are not necessarily limited to two homa or hetera; we may take the homonial homa or hetera a, b, c, d, e, &c., and deal with them in like manner as we have dealt with two homa.

Now if we take any simple existence in nature, any one will allow that this simple existence and itself are homon; and any one will agree also that so long as this simple existence and itself are homon, it and itself can not be hetera, and consequently it can not be a simile of itself nor can, it and itself be differentia. And in a previous chapter we have shown that, when we look upon nature, we gain our knowledge of cause, in the first instance through effects, which are manifested by changes. And from what we have said already, it must appear, that a homon per se can not change: whatever it may be, so long as it exists, it is the homonial homon. If then we take any sine qua non, impenetrability for instance, this sine qua non is homon.

Now if we place before us an ivory ball, we have no doubts in affirming that one of the capacial gregaria sine qua non of this ball and impenetrability are homon; and it we put before us another ivory ball, we will make a like affirmation respecting it, and therefore the first and second balls are similia. And if the first gregarium be located in the homonial where B, and the second one enter the homonial where B, the first one must take an heterical where. For, in the respect of impenetrability the two aalis are similia; and therefore the homonial similia a 'a. to-day, the one (a) in the homonial where B, and the other (a') in the where C, and the homonial similia -a.' a. to-morrow in any where are homonial similia. But respecting the homonial similia a.'a. to-morrow, if the second (a') be in the where B, i. e., if the where B occupied to-day by their"it (a) to-morrow be occupied by the second (a.'))» the second (a.) must have a simile in the first (a), and the where
of this si.MiLE, and the where B must be hetera. But if (a.‘) the first sine qua non be displaced necessarily from the where B by the entrance of the second (a.) sine qua non, is not what has happened in a single instance sufficient to establish beyond a <loubi that, whenever any whekb: is occupied by an A and another a' enters this where, the first a must be displaced? So long as homa are homa, this must be the case in any part of space at any point of time.

115 And if this be the case with the homonical similia «,'a.) must it not always be (lie case with all similical sitnilia? And if we call this displacement of one impenetrable object by an other, a law, it must be evident that this law is uniform, i. e., this law and an uniformity are homon. And in a like maQ- ner we might treat of elasticity, of fluidity, of rigidity, lubricity and so on* And so lone: as homa are homa and similia are sin\ilia, we can not doubt of the uniformities in all instances. ^

But again if we take two differentia, oxygen and hydrogen for instance, we may reason upon them in like manner and with perfect exactness. For, oxygen being an elementary thing, so long as oxygen is oxygen, as homon is hoooloa, any particular oitygen will contain all the gregaria of any oxygen, i. e., each gregarium of a particular oxygen will have a simile in any and every other oxygen: and so also with hydrogen. And hence if any homonal process unite them into water in any instance, a simile of this process will unite them into water in every instance. So long as lioma are homa, similia similia and differentia differentia, we can not doubt that a result brought out of the homonal differentia a.b. by the homonal process d, will have a simile of that result brought out of the similical differentia a.'b. by d', a simile of the homonal process d. And heuce we must conclude that The laws of nature are uniform; is a proposition which is established in our minds by the syllo- gistic process. The result of the homonal differentia a.b. by the homonal process d and A ijre homon : The homonal differentia a.b. with the homonal process D and the similical differentia a 'b.' with the similical pro- cess d' are similia; Therefore the resuU of the similical differentia a.'b.' by the similical process d' and a are similia.

We have now said all that we deem necessary to be said •at present while treating of the .syllogism. We have given the syllogistic process a much more thorough analysis than it has received heretofore by writers upon logic, and we hope that our labors thus far will enable philosophers who shall come after us to see clearly the manner, application and use of the syllogism. We, however, must proceed further, and treat of induction, a subject, which, we are ccmfident, has not been understood by writers upon that subject. Induction, therefore, will occupy our attention in Book IT.
BOOK II.

CHAPTER I.

MISNAMED INDUCTIONS.

The processes of the mind concerned in induction, in our apprehend-
BioDjhave not been understood by any writer upon logic, with whose worits
we are acquainted. Bacon is said to have been the author of the inductiye
philosophy; but his Novum Organum shows the necessity of such a philoso-
pity scientifically constructed rather than the actual construction in a
methudioal manner. Ilis remarks, as far, as they go, are not systemAtically
arranged, and therefore they are often obscu e; and from this reason with
others, his suggestions, though frequently of the greatest importance, have
not led his successors to glean from his aphorisms the true pl'inciples of in-
duction and U) work them into a scientific and methodical system of inductive
logic. That Bacon had in view a better and r^'eater system of phil')8ophj
llian subsequent writers have made out of it seems to me to be certain. The
aids for the understanding, about which he speaks so frequently, are suggested
here and there lu the second book of the Organum, but without any scientific
tieory to cement and make his remarks understood. History and experi-
nienls, without the knowledge of the inductive processes and their applica-
tion cannot aid the understandig in gaining certain knowledge of nature's
laws; and these processes, .as far as treated of, are not brought out in a
scientific manner in the Organum. Men have always bad nature before them
but the method of interrogating her has not been understood And thoughli
Bac#n made a grand beginning at explaining this method, yet most subse-
quent writers have not only, not improved upon Bacon's work, but have
underaled the val'io of such method.

There is no subject about wliich more erroneous notions prevail among
philosophers, than about the subject of the inductive processes themselves;
&nd these notions, in our opinion, are grounded upon erroneous notions
about the syllogism. Philosophers are not at all agreed, about what pro-
cesses, when pointed out shall bt called inductive; and hence results, which
are entirely owing to the syllogism, are often claimed as inductions, induction
having some vague and unexplained meaning. The better way, however, to
show what results are owing to the syllogistic process, is to explain the
syllogism, and then the reader himself can make the application to any case,
which may arise; this we have endeavored to do heretofore. And the better
way to show what results are owing to the inductive processes, will be to
explain these processes. But before doing this, from the manner in which
the subject has been treated by authors heretofore, it is necessary, in order to
hei^ell understood by the reader, ior us to show some things, which hav'

been called induction, but which is our sytem do not at all come under the
meaning, which we attach to that term.

Archbishop Whately has treated of induction, but his erroneous no-
tions, as we conceive, of the syllogism, led him to misconceive the nature of
the inductive processes; thou^i mttmy of his remarks are valuable in helping
to clear the way for a better understanding of the matter. The scholar,
however, who has done more, perhaps, than any ether, in clearing th« way,
is I. Stuart Mill. His treatise upon logic is learner<l and able, though we
can not agree with him either upon ratiocination or induction. Archbishop
Whately has well remarked that the syllogistic process is not the sole process
necessary in reasoning in a syllogistic manner; and we may state that we do
not consider the syllogistic and inductive processes together to be the only
processes used in gaining truth, as any one will underst4*nd, who has studied
the remarks made in the chapters previous to those treating of propositions
and the syllogism in book 1. But to attempt to notice all the processes,
which have been brought forward as inductive, but which we do not regard
as such, would require too much room in this book, and besides, as we think,
it win be un accessary.

And first, when a name suinds for, or points out a sine qua non, which
distinguishes the existence fnv wliich it stands from otiiiers, we do not con-
sider that the inductive process has anything to do with iMovin<r this sine
qua nea, or with proving the general proposition, which may be constructsd
upon this sine qua non. All those truths, which we have called nominal
truths, are each «>f them, a sine qua non of themselves; and hence there is no
induction in establishing the truth of the proposition that, every color, in
any place at any time, is a color, but the tr.ith of such proposition is estab-
lish^ by the singular hamoniCHl syllogism, as we have shown heretofore.
Neither do we consider induction to be the col letting of a sufficient number
of instances to warrant us in believing that the instances, wliich we have
seen, are fair specimens of the class. We should think strangely of a man,
who, after having been informed that the name island distinguishes a portion
of land entirely surrounded by .vater should start on a tour to examine this
and that isfand, until he had a sufficient number of instances collected to
warrent the inference that, all islands are surrounded by water; yet Arch-
bishop Whately 's conception of induction does not rise higher than thi.^.
The Archbishop agrees with Aldrick, that, from the examination of this and
that magnet, we conclude that all magnets' attract iron; when in ti'uth, mmjfr
netism, the quality of attracting iron, is the sine qua non of magnets, and it
must of necessity exist in every thing, winch may be called a magnet. And
wo<lseeDt altogether from Mr. Mills definition that, "induction may he con-
sidered the operation of discovering and proving general propositions." And
instead of believing with Mr. Mill, tb«t induction i:« at the foundation of all

general propositions, we do not think that any general proposition can be
established by induction. We therefore state to the reader that th« process,
about which we shall speak hereafter under the name of inductive, has
nothing to do with establishing e^eneral propositions, and that such notion
has a tendency to obscure the whole subject.

We mast also be 'careful to avoid another error ot Mr. Mill, in con-
sidering induction to be generalization from experience. We have hereto/ore
shown that, generalizationioH from experience proceeds upon the singular
syllogistic process; and if we go any farther than experience and infer that
cases to which mankind's experience does not extend, will besimilia of those
falling within that experience, the experience is not an inductive, but a pro-
bable one. The case given by Mr. Mill himself of the mistake made by
mankind in infering that all swans are white because they had seen a great
number of white swans, and not a single instance of a swan of any other
color, shows that the induction, if it be called so, was faulty, and in our estimation it was no induction at all, but merely a probable inference from numbers, the inductio per enumerationem simplicem of Bacon. Propable inferences may be drawn, with which we are perfectly satisfied, though we can not know that they are certainly true. Day and night have succeeded each other with perfect regularity so far as the experience of mankind extends, and for that reason alone there is a strong probability if we can see no cause for a change that such will be the case hereafter. But from the circumstances that no exception to a certain uniformity has fallen within the experience of mankind, we do not infer by the inductive process that there will be no exception hereafter. From the continuous uniformity, extending far through experience, we are led to believe upon the ground of probability that the causes producing such uniformity will continue to act without interruption, though we know not what these causes are, nor that they will certainly continue uninterrupted.

The case of the naturalist inferring that all horned animals are cloven footed, because all those horned animals, which have fallen within the experience of mankind, are so, rests entirely upon probability, and not upon induction unless the inductio per enumerationem simplicem be true induction. If it had always happened within our experience that every Friday brought some ill-luck, the inference that every Friday in the future will be unlucky, will be just as probable to our minds as the case of animals with horns having cloven feet, yet there is nothing in the nature of such inference that corresponds to what we mean by induction.

Again, we do not agree with Mr. Mill in the office of induction in ascertaining the distance from the earth to the moon. Mr. Mill says, "the share which direct observation had in the work consisted in ascertaining at one and the same instant, the zenith distances of the moon. From two points very remote from one another on the earth's surface. The ascertain-ment of these angular distances ascertained their supplements; and since the angle at the earth's centre subtended by the distance between the two places of observation was deducable by spherical trigonometry from the latitude and longitude of those places, the angle at the moon subtended by the same line became the fourth angle of a quadrilateral of which the other three angles were known. The four angles being thus ascertained, and two sides of the quadrilateral being radii of the earth; the two remaining sides and the diagonal, or in other words, the moon's distance from the two places of observation and from the center of the earth, could be ascertained, at least in terms of the earth's radius, from elementary theories of geometry. At each step in this demonstration we take in a new induction represented in the aggregate of its results, by a general proposition." Now we do not consider that there has been any induction at all in the above problem, but that, after the observations are made, the whole process is syllogestic; and any one, who has mastered what we have said heretofore in Book 1st, we apprehend, can make the application and demonstrate the problem by the syllogism.

Neither do we agree with Mr. Mill that the uniformity in the course of nature, or what is the same thing more definitely expressed that like causes with like conditions will produce like effects in any place at any time is the highest induction, nor do we consider it to be any induction at all. Neither do we consider "this assumption," to be as an assumption involved in any case of induction; nor can we consult the actual course of nature in any regard farther than our experience extends, which is not sufficient
to warrant an inductive influence. But we have shown heretofore that the uniformity of nature, or that like causes with like conditions will produce like effects in any place at any time, is demonstrated to our minds by the plural homonical syllogism.

There in an other improper use of the term, induction well pointed out by Mr. Mill, it is the case of the navigator approaching land and being at first unable to determine whether it be a continent or an island; but after having coasted around and having arrived at the same point from which he started he pronounces it to be an island. This navigator by connecting together all his observations finds that this land is surrounded by water, and every island is a portion of land surrounded by water, and therefore this land and islands are similia — this land is an island. Mr Mill continues to show that Kepler ascertained the figure of the orbit travelled by the planet Mars, by observations separately made but connected together in a like manner with the navigator, and justly concludes that there was no induction in the process. But Mr. Mill considers that Kepler did make one inductive inference, when he inferred that the planet would continue to revolve in an ellipse. Now if this inference was made upon the grounds that like causes will produce like effects then the inference was syllogistic; but if it was made upon the grounds that the planet had always gone in an ellipse heretofore, the inference was a probable one; and in no case could such inference be made by induction.

The remarks might be continued at great length; but if the student has mastered the syllogism, he will be able to see that many results purely syllogistic have been attributed by authors to induction, and that the term induction is very often used without any definite meaning at all. Having, therefore, set the mind of the reader free, as we hope, so that he will not look in wrong directions, we will proceed and come nearer to the subject, and explain what we consider to be true induction.

CHAPTER II.

INDUCTION DISTINGUISHED.

Having spoken in the previous chapter of certain notions of induction which we wish the reader to keep out of his mind, while following us in our future inquiries, it seems necessary now to state what we mean by induction, as well as words can express our meaning in brief, and use give the reader some clue to the directions in which we propose to go in search of truth. Induction, then, is the result of those processes of the mind by which the unknown causes of any given effect are discovered; and the processes of the mind engaged in such discoveries are the inductive processes. We stated in a former chapter that we gain our knowledge of cause, in the first instance, through effect, i. e., we can not look upon any aggregate existence, and before we have the knowledge of effects, determine such existence to be or to contain a potential cause of any given effect. «And in studying the inductive processes we must always have some given effect before our mind and from it determine the causes: the inductive processes have nothing to do in taking causes and from them determining effects. If indeed we take two elementary substances and put them together and a certain effect follow we take this effect and determine that those elementary substances were the causes of it; and when we have done so, we have also, from the correlative natures of cause and effect, determined that the phenomenon which we call
an effect, is the effect of those causes; but we must always keep the effect in view, it must be in view always before the inductive processes can have any thing upon which to operate, while the causes of a given effect may be and Always are entirely out of sight or without our knowledge when the induc-tive processes commence to search for them. If tha reader wil! bear this in mind it will free the subject from much obscurity, which otherwise sur-rounds it.

And since cause and effect are always involved by the inductive pro-cessej, it is necessary also, to put the reader upon his guard t\^f\^g\^l\^nay not

contound what are called a priori and a posteriori reasonings with induc-
tion. After that we have gained the knowledge of certain effects and tlieir causes, we look upon these causes and their conditions, and infer, by the ]\lunil homonical syllogism, what effects will follow, without waiting to witness such effects by our senses. For instance. If a cannon be loaded with dry powder and a man be about to apply a match to it, by the plural homon-i-cal syllogism we infer that there will be an explosion This application of t lie syllogism when we have the conditions as the homonical similia or differentia, whose effects we know in the premises, and from them we infer th(* effects of similical similia or differentia, whose effects have not yet transpired in time and space, is called a priori reasoning, or reasoning from cause to effect. Induction, however, has nothing to d(» with it.

On the other baud, if we see a cannon and hear the report of its dis-
charge and we be asked, what is the cause of thii report, from our former knowledge of such effect and its causes, l>\y the plural homonical syllogism, we infer the cause of this particular effect. And this application of the S3'\l\og\i8\m, who we have an effect whose ciuses and conditions we know as the h\f\monical homoo in the premises, and we infer the causes and condi-tions of a similical homon, whose causes and conditions are not witnessed by our senses, is called a posteriori reasoning, or reasoning from effect to cause. But there is no induction in it.

Both A PRIORI and a posteriori reasonings are entirely syllogistic. In both, some particular case has brought by induction the knowledge, in the first instance, of a certain effect and the causes and conditions of it to our minds, and then this case furnishes the premises for the plural homonical syllogism to work with, either a priori or a posteriori. But when the causes of an effect, an homonical homon, are unknown, no inference can be drawn a posteriori respecting the causes of a similical homon; neither can any inference be made a priori respecting the effect of similical similia or defferentia, when the effect of homonical similia or differentia, the effect of such causes, is unknown to us. The knowledge of certain effects with their c luses is already in the mind before a posteriori or a priori reasonings begins. Tlie inductive processes take hold of any given effect, the causes of any similical effect and also of this given effect being wihoul; our knowl-
edge, and search out and induct the conditions and causes of Uto given effect. Keeping, then, in mind that, a priori and a posteriori reasoning are syllo-
gistic and thpt they proceed from certain known cases to infer respecting similical cases, while the inductive processes proceed from a given phenome-
non lo mvke kno.\'u to us the causes and conditions of that phenomenon, we will proceed farther, hoping that we will not be misunderstood

Now in speak ins: of cause and effect, it is usual with ohhisophers to c...: :1.eciti:.:c a., sinlecedent and ! he effect th"ife!f"(^4^^98\Yhese terms.
aotecedent and consequent, have reference to the relation of points in time, and we have already shown heretofore, that time possesses no capacial gregaria and that it can not be the cause of any change or effect. And therefore it we say that a cause is an antecedent, we must mean only that the existence whatever it may be, to which we refer as cause, occupied a point in time prior to the point occupied by the existence which we call the effect. And although this be true, yet it does not with any definiteness determine a cause. If we say that a cause is an antecedent of an effect, i.e., a cause and an antecedent are homen, we may still enquire what antecedent is referred to as connected with any given effect, for there are many things which existed in nature prior to John Smithes being intoxicated, and which antecedent is connected with this effect? It is, therefore, merely the condition of a cause that it exist antecedently to an effect; but antecedent is a term which can not be used as synonomous with cause.

Now we have shown heretofore that time and space can not be the causes of any thiojy; they are however the conditions of all causes and effects, and they are the only things of which we shall speak in our future inquiries as conditions. Every thing in nature which can be a cause, can be cause only upon the conditions of time and space, and that which has once been a cause, will in like conditions of time and space in the future be a cause again. A condition which presents the absence of a preventing cause is sometimes confounded with a cause, as the absence of the air in a pump is, sometimes said to be the cause of the water rising in it. This however is but a condition of space.

We define causes therefore, to bethe capacial gregaria of the aggregate existences from which g'vq changes or effects spring. To go behind the capacial gregaria of aggregate existences and inquire into the ontology of these capacial gregaria is no part of our undertaking at present. We may say. Indeed, that they are the manifestations of the Deity's will, i.e., that they are the capacial gregaria of the Almighty himself made tancable to us; but we take these capacial gregaria of existences made known to us, as the only causes of which we shall treat and we shall legard them as the primary causes of all the effects in nature. If any one shall say that the Almighty is still a prior cause, we have no objection.

And it will occur to almost any one, after what has been said about cause and effect in a previous chapter, that an homonal capacial gregarium per se can not be a cause of any given effect; there must be heterical gregaria implicated before any effect can be produced. If we take an ivory ball, which possesses the capacial gregarium of impenetrability, i.e., the power to remain in space, we must see that this capacial gregarium ytev se can pro-duce no effect whatever. If the ball l)e at n^st its impenetrability can not start it, and if it be in motion its impenitrability can not ir.bility in the ball can per se produce nothing. But if an other ball po-scassing also imperitr ability be brought to bear upon the first one, the heterical impenetrabilities, on3 in each ball, can inter se produce an effect. Homon ler se must always remain homon, and per se no effect can spring from an homonal gregarium; and hence all effects in nature are produced, not by an homonal gregarium, but by heterical gregaria. And as the capacial gregaria of the aggregate existences, from which changes spring, are the causes of all the phenomena of nature, it is necessary in seeking for these causal
gregaria of any effect, to find, in the first place, the aggregate existences possessing the said gregaria, and to separate them from others.

And in contemplating the aggregate existences, whose capacial gregaria are causes, it will readily appear that aggregate existences may be divided into primary, secondary, tertiary and quartuary aggregations. By a primary aggregate existence, we mean what is usually called an elementary substance, and by secondary aggregations, those substances compounded of two elements, by tertiary aggregations, substances compounded of three elements. If such compounds exist in nature, and so on. And if we take any primary aggregate existence, a jar of oxygen for instance, as this is an elementary thing, it contains all the capacial gregaria of any oxygen. For if any other oxygen can be found with a less number of capacial gregaria, then the first jar was not elementary. But if we examine any elementary oxygen, as all other oxygen is a simile of that which we have examined, any experiment with certain oxygen giving a certain result will under like conditions give a simile of that result with any oxygen; and so also with any other primary aggregate existence. And the differential elements constitute the primary aggregate existences in which reside the capacial gregaria which are the primary causes of all effects in nature. These elements combine and form chemical compounds, which possess capacial gregaria different from those possessed by either of the elements entering into them.

Now every capacial gregarium possessed by a primary aggregate existence, is a sine qua non of that aggregation, and it has a simile of itself in every other aggregate existence, which is a simile of the given aggregation; and this is true also of all compounds. And hence we can experiment upon all aggregate existences, and by the homonical syllogism, infer from the result in any case the results in all cases of similical similia or differentia.

And the first things to be determined by observation or experiment, about aggregate existences, are the conditions of time and space by which their capacial gregaria are regulated. And if we find by observation or experiments upon nature that, a certain gregarium of a certain aggregation is conditioned in a certain manner, we know that a simile of that gregarium in similar aggregations, will be conditioned in a similia manner, and in like manner and with like increuces, we may experiment by imitation in fasciculo, with aggregate existences themselves. Having now cleared the way as we hope, we will in the next chapter proceed to explain the conditions of time and space, which regulate the capacial gregaria, and we will then see the manner of proceeding to some extent, and the reader will be able to understand better, what we mean by induction.

CHAPTER III.

CONDITIONS OF TIME AND SPACE.

We already said that the condition of causes and effects are time and space; we have also shown, that not an homonical gregarium but heterclical gregaria are the causes of every effect. And in a previous chapter upon cause and effect we showed that, in every effect some homon becomes hetera or some hetera becomes liomon, some similia become differentia, or some differentia become similia, some commensura become incoraensra or vice versa; this, we saw, is a condition of causation. And if we take two ivory
ball?*, each of which possesses impenetrability, we must see that the impeni-
trabities of the balls are hetera in space; but we must see also that, unless
these hetera in space occupy an homonical time, i. e., unless their times be
homon, no effict can be produced by them inter se. If an effect is to be pro-
at at a certain point of time between two ivory balls, but before that point of
time come, one of the balls be annihilated, we must see that the proposed
effect cannot transpire from the want of an homonical time for the two balls.
Those existences, which existed yesterday but not to-day, can not be the
causes of effects, which begin to transpire to-day, i. e., causes must possess
an homonical time with that point in which the effect begins to transpire or
originates. And hence let the effect be the removal of a cart from a certain
place to another upon a hill, and let us take it for granted that some horse
drew the cart up the hill, and suppose we wish to ascertain the individual
horse that did it. In the first place we must ascertain the homonical time in
which this effect occurred, then we may think of Bucephalus the horse of
Alexander; but we know that he could not have done it, if the times of
Bucephalus and of the effect are hetera. And we know that no other horse
than one, whose time of existence is homonical with the time of the effect,
could have done it. But any horse, whose time is homonical with that of the
effect, may have done it, i. e., such horse fulfills the condition of time. And
hence all aggregate existences possessing the causal gregaria of any given
effect, must be synchronous with the transpiration of the effect, i. e., their
times and the time of the beginning of the effect must be homon.

Let us next look into the conditions of space. For, as all the acting
causes of any given effect must be synchronous and in space, we must deter-
mine the conditions of space; and where the conditions of space can be de-
termined, we know that, no aggregate existence, outside of those condition?^

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ill any given case, can be an aggregation, which contains the causal gregaria
or a causal gregarium of the given effect. And we must remark that, where
two aggregate existences contain the heterical gregaria, which are the causes
of any given effect, these gregaria must operate through the space situated
between the two aggregations.

A B

If A and B be two aggregate existences with a certain space between
them, and A put forth certain energies, these energies must take some direc-
tion in space; and unless they take the direction towards B, the energies of
A and B can not meet in an homonical where, and unless the heterical ener-
gies come to an homonical where, no effect can follow.

D A B C

Suppose, for instance, that the energies of A take the direc-
tion only towards D, and the energies of B only towards C, then the spaces of lii-e e
heterical energies will always remain hetera, and no effect can follow from
these heterical energies inter se. The conditions of aggregations existences in
space, therefore, necessary to causation, are that, the heterical gregaria posses-
sing heterical wheres, shall find an homonical where, i. e., tijat their wheres
shall in some point of space come to be homon. And it will readily be sug-
gested that, though these energies may take the direction towards each other,
yet they may not meet.
Thus: Suppose A to be a magnet and B an iron filing, if A's energy terminates at C and B's at D, then they have not found an homonical where, and therefore no effect can follow.

Now a homon of time and a homon of space are the conditions sine quibus non of causation; and all the gregaria, which can be causes, must come into these two homonical hetera. And hence whenever any effect takes place, these conditions have been fulfilled; and the object of inductive inquiry is to find, not only what objects fulfill these conditions, but also what objects operate, become acting causes in these conditions, i.e., what gregaria in these conditions are the sine quibus non of any given effect. And we must always recollect that, we must have a certain effect in view, and that effects inter se similia may be produced by sets of causes, inter se simulalia, i.e., by similical similia or similical differentia. And as gregaria are found in aggregations, we must first determine the aggregations containing the causal gregaria of any given effect to this task we will now proceed.

CHAPTER IV.

HETERICAL INDUCTION

We have heretofore treated of simple heteration and shewn that the power of the mind to heterate depends upon time and space. The succession of our own thoughts in time enables us to heterate them, and the revolution of the earth and of the heavenly bodies in time enables us to fix upon any particular period of time and hold its relations in our mind. By the where of ourselves and the where of other objects in space and their relations inter se we are also enabled to locate a particular where in space and preserve its relations in our minds. And although we may not always be able to point out the precise instant of time, in which a given effect begins to take place, we can generally come near enough to that period for the purposes of heterical induction; and so also we can come sufficiently near to the precise where in space of a given effect. Simple heteration is sufficient to bring us to the point of time and the point of space of any given effect under consideration of the inductive processes. And when we have the period of time in which any given effect took place, as the cause of that effect must have been inter se synchronous and have touched upon some homonical point of that period, no aggregations before or since that period could contain the causal gregaria of that effect. If the deed was written in the age of Augustus, no person, who lived and died before that age, or who has been born since, could have written it. And hence if we know the period of time in which any given effect took place, all aggregate existences, which have not an homonical time with that period, are immediately heterated from the causes of the effect by our minds; and this is heterical induction. For, when we have out those existences, which could not have been the causes, we have before us other existences, which may have been the causes, and by casting ut the former we have led in or inducted the latter. And were there but two aggregate existences in esse at the period of time of the effect, as there must have been heterical gregaria concerned in producing it, we would know
by the heterical induction of aggregations by their times alone that, these two existences contained the causal gregaria of the effect.

But although the heteration of objects from the time in which any given effect takes place, by throwing out many aggregations which could not contain causes of the effect, narrow the field in which the causes are to be found. Yet there are afterwards so many aggregate existences in esse synchronous inter se and having times homonical with that of the effect, and any of which, therefore, so far as time is concerned, may have been causes of the effect, that after that we have determined the homonical time of the effect and determine also what existences have times homonical with this, we are still unable to tell which of these contemporary existences contained acting causes in the present instance. We have, tluMsMHoHt, to proceed farther and heterate the wheres of objects from the homonical where in \ Which the effect took place. Although this be an easy matter in some instances, yet in others it is attended with great difficulties. If we see an object in motion by heterical impenetrabilities, if a ball be started by the implicit

of some other object, every object, which at the homonical lime of the effect's beginning, was outside of the homonical where of impact, i.e., whose where and the where of impact were lietera, can be immediately heterated by the mind from the causes of the effect. And so also, from the very nature of compounds, we know that, the ingredients compounded must come in contact or they would not enter into compounds together.

And all though we can €10 l tell but that other existences than those ingredients which enter into compounds, may have something to do with illicit compounding of those ingredients, yet if the action of these other existences be always constant at all times and places, whenever and wherever a given effect is offered to our senses, for all practical purposes their action may be omitted in our considerations without any error to our principles (for results. Thus; although we may not be able to heterate the space, which bounds and limits the capacial gregaria of the north polar star, from the space in which pine shavings are burning, yet if the iiitiaeiee of t ic north star be constant whenever and wherever sh.ivings and fire are found we our earth, for nil practical purposes we may omit this influence in our considerations ;ind stek after other ngL^regati »ns, wiu)se capadal gregaria we can dctlrrmme and limit in space; and if their space and the space in which shavif^s arc burn ing be hetera, we may immediately heterate tliose oiller agregilins from the causes of the effect. And luMice, whenever, for instance, we find so.-ip, \vc feel assured that no ingredients outside ot those which have come in coniaci, can contain the causes of soap, or at least we may li>(k tor and receive as causes, if not all of the causes, some capacial gregari^n coniaineu in the ingredients, which have come in contact when s<»ap came into existence ns an effect.

But in numerous instances, for the purporses ot the heleiical induction of aggregations in space, we must follow Bacon's rule of varying the circuni-stances, i.e., we must find what capacial gregaria of aggregate existences are within the homonical time and place of given effects in one and the other instance of similical effects. SOMETIMEST by observation upon numerous instance of similical effects in nature, we are able to heterate aggregate existences from others containing the causal gregaria; and very frequently we can do this by experiment. If, in the consideration of compounds, for instance, a chenjist can analyse and find a certain portion of water to contain the primary aggregations, oj''gen, hydrogen and sulphur, in one instance, and in another io-
stance, he find a portion of water to contain oxygen, hydrogen and potasiura, he may then, the latter instance, heterate sulphur from the sine quibus non of water; for, in the latter instance, water occurs without sulphur being in the homonical space of the effect: and by the former instance he can heterate potasium from the sine quibus non of the effect. But it is not quite clear from the above analysis of the chemist, that both potasium and sulphur can be absent from the water; for, oxygea and hydrogen may not unite, for anything we yet know, into the compound of water, without the presence of either the one or the other of these substances. But if the chemist find a portion of water containing only oxygen and hydrogen, he may then heterate all other aggregations from the sine quibus non of water. But neither oxygen nor hydrogen can be heterated from the causes; for, they are, each of them, primary aggregations, and were one of them taken away, there would not be left netericat gre'ria to produce an effect. Now if a chemist can take certain elements and by them produce a compound or any given result, the mode of making heteretical inductions in the case is the same as in analysis. He must wait until he perceives the effect, before he can heterate any object from the causes of it. The only difference is that in analysis he must seek after the aggregatics, which are in the homonical time and place of the effect in different instances, while in synthesis he already knows the aggregations in the homonical time and place of the effect without inquiring after them.

And in general, if we suppose any given effect, to contain in its homonical time and place, the aggregations represented by a, b, c and d, in one instance, and in another instance a, b, e, f, and in still another a, b, g, h, we may, from the consideration of these three instances, heterate each of the aggregations severally^ excepting a and b, from the sine quibus non of the effect; though it is not certain that a and b alone could produce the effect without the presence of some of the others unless we can find an instance in which they alone are present. Bacon's rule of varying the circumstances, or of examining different instances of similical effects, it will be perceived, enables us to heterate, from the causes in certain cases, objects occupying the homonical time and space of an effect; one instance can be used to enable us to heterate some of the aggregations from the sine quibus non of another.

This matter of varying the circumstances and thereby gaining the data from which heteretical induction can proceed may be explained in a little different manner from that already given, though it comes to the same thing. Thus; if we mix together three gasses represented respectively by a, b, and c, and we apply this mixture to a piece of white paper, for instance, and observe the change or effect, which takes place in the paper, and we then apply the three gasses, a, d and e, and observe also the effect upon the paper, and we find the two effects to be inter se similia, the latter instance enables us to heterate b and c from the sine quibus non of such similical effects, and the former instance enables us to heterate d and e in the sine quibus non, leaving the effect to take place between the capacial gregaria of a and of the paper. If we represent the paper by x, we may say, a, ii, c and x produce a given effect, which we observe upon x, but a similar effect is produced upon X by a, d, e and x, and therefore, b and c are not sine quibus non of such effects, nor are d and e. And if a, b and c, each of them, leave changes upon the paper, which can be inter se discriminated, which changes may be rep-
sented respectively by the capitals A, B and C, and in an other instance, a, d and e, produce changes, which can be discriminated inter se, we may then find from the gregaria of a, b, c and x the effects a, b, c, and from the gregaria of a, d, e and x, the effects, a, d, e, and from these data we can heterate b and c, and d and e, from the sine quibus non of the effect a &c.

Heteretical inductions are made daily in the transactions of life and always have been so made, though like the syllogistic processes, the modus operandi of the mind has not been well understood. A very simple case of heteretical induction is continually made before courts of law. If a man be indicted for murder and an alibi be proven, i. e., if it be clearly shown, that the person charged with the crime, was at the time when the crime was committed, a hundred miles from the place in which it was done, the accused is heterated from the causes of the murdered man's death. The principle of heteretical induction may be summed up in the following heteretical proposition: whatever is absent from the homonical time or place of a given effect, and the causes of that effect, are hetera.

CHAPTER V.

HOMONICAL INDUCTION.

In the previous chapter we explained the modus operandi of the mind in separating those aggregate existences, whose gregaria can not be causes of a given effect from other aggregations, whose gregaria may be the causes, so far as time and space are concerned, i. e., their times and wheres fulfill the conditions of causation. In the present chapter we must show the process of the mind in determining what aggregations fulfilling the conditions of time and space, and the aggregations containing the causal gregaria are homonical hetera. Although we may heterate all other objects from the homonical place of a given effect at the time the effect took place, excepting a, b, c, yet it is not certain that a, b, c, each of them, contain the causal gregaria of the given effect, nor is it certain which of them do contain causal gregaria. Three men may have hold of a rock when it begins to move, and yet one of them may have done all the lifting. And supposing that lye, sand, sawdust and adipose tissue be put together in a kettle and boiled, and soap be the result, Which of these ingredients contained the causal gregaria of the effect? We might, no doubt, heterate some of these ingredients from the causes in the manner pointed out in the last chapter, but our object now is not to find existences, which in relation to the causes of the effect are heterical, but to find the aggregations, which are homonical with these containing the causes. And in order to find the homonical aggregations we must again follow Bacon's rule of varying the circumstances. Suppose we take lye, sawdust and sand without any adipose matter and boil them just as spoken of above, and find that no soap is produced, we may then conclude that adipose matter was a sine qua non of soap in the first experiment. And hence when we wish to ascertain whether any one of the aggregations, fulfilling the conditions of the lime and place of a given effect, be a sine qua non of that effect, we first ascertain, if possible, all the aggregations fulfilling those conditions, and then we find an other case having all the aggregations as before, excepting that aggregation, whose gregaria as sine quibus non, we wish to try; and if in the latter case the effect is not produced as in the former one, then this aggregation left out of the latter case was a sine qua non of the effect in the former case. Thus; if in one case we find the aggregations fulfilling the conditions of the time and place of, the effect a, to be
a, b, c, and d, and in another case we find a, b and c without d in like conditions as before. Without the effect a, we then have the data from which to make the homonational induction, that d was a sine qua non of a. That the sun is a sine qua non of day may be proven by taking the case of a bright day and a case in the same day, when the sun is eclipsed by the interposition of the opaque body of the moon, or when the earth revolves and takes us away from the sun.

I And it is no matter which of the two cases, one of which contains all the aggregations and the other all excepting one, come under our observation first. If a, b, c and d, be found in certain conditions, and then e also come into those conditions and then the effect a immediately commences, all the data of the two cases required are furnished. Before the sun rises, we have the aggregations, a, b, c, ..p without day; when the sun rises we have the aggregations a, b, c ..p and the sun, and then it is day. And if we can fit the cases by which we can thus try successively each one of the aggregations fulfilling the conditions of time and space, we may find, by homonational induction, all of the aggregations containing all the causal gregaria of any given effect. But we must be sure that the case, in which the effect does not occur, contains all the aggregations excepting the one, which we are trying as to its being a sine qua non, and which, the case, in which the effect follows contains. Thus; if the case, in which the effect a, follows, contain the aggregations, a, b, c, d and e in a homonational time and place, and we wish to see whether a, was a sine qua non of that effect, we must find a case in which b, c, d and e are found in a similiar time and place without the effect.

If there be more aggregations in the case in which the effect does not follow, i.e., if there be b, c, d, e and f in the case without the effect a, and a, b, c, d and e without f in the case where the effect follows, as the effect a does not follow in the former case, the additional aggregation f would not vitiate ourifference respecting a's being a sine qua non in the latter case, unless some effect due to f should prevent the effect a in the former case. If a, b, c, d and e be found to make a compound in the condition g, and b, c, d, e and f remain but a mixture in the condition g, we may infer a to have been a sine qua non in the former case, unless f be a preventing cause in the latter one. But for entire certainty it is necessary that the two cases agree in the aggregations except the one which we are trying. If we have a given effect a, with the aggregations a, b, c and d, in one case, and in an other case we have the aggregations b and c only and without the effect, we can not tell which or whether both a andd were not sine quibus non of the effect a, in the former case. The principle of homonational induction may be summed up in the following homonational proposition; whatever existences are sine quibus non in the homonational time and place of an effect and the causal gregaria of that effect, are homonational.

CHAPTER VI.

DIFFERENTIAL INDUCTION.

We have already seen that the homonational a and the homonational a, through their times are hetera, are in space homon, i.e., they are in the same where at any given point of time. We have also seen that the
homonical a and the heterical * a, 1 hough their times mny be homon, thVe hetera in space, i,e, one a, has a certain where and the other a, has an other certain where, both of which wheres may be occupied at the same time. We have also seen that hetera he at the foundation of ciusation, and that things inter se similia, and also things inter se differentia, must be inter se hetera; and hence either similia or diff'rentia are the causes of every effect. The homonical a, and the heterical a, are inter se hatera, they are also inter se similia, but a, and b, are hetera and they are also inter se differentia.

Now as the gregaria of aggregate existences are the causes of all effects and as there must be heterical gregaria concerned in the production of every effect, and as the heterical gregaria concerned must be inter se similia or differentia, it is the province of differential induction to eliminate those gregaria, which, with reference to the causal gregaria of an effect existing in either of the aggregations in the homonical time and place of such effect, are differentia. And in order to do this, we must first make heterical and homonical inductions of aggregations, (we may then also make heterical inductions of gregaria, which is as far as Bacon pushed induction) and then we must make differential inductions in the method about to be explained. And in order to understand the matter thoroughly, let us approach the subject by first clearing the way. Suppose we take two aggregate existences, whose gregaria we know, and suppose the gregaria ot the first aggregation to be, a, b, c, d and e and no niiore, and the gregaria of the second aggregation to be a, b, g, h, i, and no more, and suppose that in an homonical time and place, by heterical and| homonical inductions of aggregations, a certain 'effect, which we will call a, to spring from these heterical aggregations; then we can not tell, wliether the effect a, sprung from the siinilia a and a, or b and b, or from the differentia a and b, b and b, or c and i &c. But supposing the effect to have sprung from but two heterical gregaria, these heterical gregaria must be located, one in each aggregation, and not both in the same aggregation, otherwise the effect would spring up in a single aggregation and the two aggregations would not be sine quibus non in the homonical time and place of such effect, as we may iiave determined to be the case by a previous homuncal induction, and without a previous homonical induction pf aggregation ', differential induction of causal gregaria can not proceed.

But suppose we take five aggregations, whose gregaria we know, the the gregaria of the first being a, b, c, d and e, and no more; those of the second a, b, c, d, and f, and no more; those of the third a, b, c, e and f, and no more; those of the fourth a, b, d, e and f, and no more; th<se of the fifth a, c, d, e and f, and no more. Now we can conclude, by heterical induction, that the effect, which springs from the first and second aggregations, is not caused by the similia e and e, for b does not exist in the second aggregation; and the effect which springs from the first and third, is not caused by the similia d and d; and the effect, which springs from the first and fourth, is not caused by the similia c and c; and the effect, which springs from the first and fifth, is not caused by the similia b and b. If now the four effects be inter se similia and in view of the above state oi the case, we look upon the second aggregation, we conclude by heterical induction that, in thai aggregation e was not a sine qua non of the effect, which sprung from the combination of the first and second aggregations; and hence a simile of it is not a sine qua non in any other aggregation, which may combine with a simile of the first aggregation and produce a similical effect. And in the other instances, we may eliminate by heterical induction, d from the third aggregation, c from the fourth, and b from the fifth.
We have not been speaking above of any other effects than these arising from the given combinations of the given aggregations, which by previous heterical and homonical inductions we know to be the aggregations containing the causal gregaria, and the gregaria of each of which aggregations we know also. There may, for all that yet appears, however, be other aggregations containing causal gregaria of effects, which, with reference to the given effects spoken of above, are similia, and yet the causal' gregaria of the other effects, with reference to the causal gregaria of the given effects, may be differentia. But suppose there be other aggregations containing other causal gregaria of an heterical effect A, these other causal gregaria, with reference to the causal gregaria of the homonical A, the effect above spoken of, must be either similical differentia, in which case the heterical effect is but another instance of like causes, i.e., the causal

aggregation and f in the second, for instance, if the causal gregaria of an heterical A\ and A' being inter se similia"be similical differentia, the causal gregaria of the heterical A' are the similical differentia a' and P; or the causal gregaria of the heterical A, with reference to the causal gregaria of the homonical A, must be differential differentia, i.e., the causal gregaria of the homonical A C being the homonical differentia a and t, for instance, the causal gregaria of a heterical a, may be the differential differentia e and g, for instance for aught that yet appears. But in no case, the causal gregaria of the homonical A being the homonical differentia a and f, can the causal gregaria of an heterical A be, with reference to the causal gregaria of the homonical A, similical similia; for the similia a and a, b and b, or d and d, &c., to be similical similia with the homonical differentia a and b, is absurd and impossible.

But supposing the causal gregaria of an homonical A, to be the differentia a and f, may not the causal gregaria of a similical A, be inter se similia, such as k and k, y and y, or z and z? Now if we contemplate the causal gregaria of the homonical A, and those of the similical A, as the two a's are inter se similia in every respect, and as each of the causal gregaria of both a's is not an aggregation but a simple gregurium, the effect produced by a and f inter se can not be a simile of an effect produced by a and a, inter se, so long as homon is homon, and similia are similia; and if a can originate upon a* a simile of the effect, which f originates upon a, then a and ( must be inter se similia, which is absurd. If a certain vibration of the atmosphere in connection with the apparatus of the ear produce a certain sound, then a simile of that sound, the apparatus of the ear remaining the same, can not be produced but by a simile of the given vibration.

But in the case considered above, the causal gregaria in the first instance being by supposition the differentia a and f, and in the second instance the similia a and a, one of the causal gregaria (a) in the first instance and one (a) in the second are inter se similia; that no effects inter se similia can spring from such sets of causal gregaria, is evident. But an effect, an homonical a, having sprung from the causal gregaria, the homonical differentia a and f, may not a similical A, spring from the similia, g and g? In the first instance a originated upon f, an homonical effect A, and we see that g cannot originate upon f, a simile of A, unless a and g be inter se similia; but in the
first instance, by changing the mode of expression without affecting in any
manner, the result, f originated upon a, the homonical effect A, and g cannot
originate upon a, a simile of A, unless g and f be inter se similia; but a is an
homonical gregarium and g is an homonical gregarlum, and inter se they are
differentia. Now two gregaria inter se differentia can not in their action be
inter se similia unless similia and differentia be inter se similia, which is
impossible. And if a cannot act towards f, as g acts towards g, and if f can-

And f, and between g and g, can not be inter se similia. And an homonical
effect a, having sprung from the homonical differentia a and f, we may rea-
son Id like manner respecting the effect, which must spring, if at all, from the
differential differentia g and h. So tttio if an effect spring from the similia a
and a, no similical effect can spring from the differentia a and b, c and d, &c.,
nor can a similical effect spring from differential similia as b and b, or c and
c, &c. Of the differential elements of the alphabet, no other two can be
conjoined so as to produce the sound resulting from ab; and so it must be
throughout nature. And hence it must appear that effects inter se similia in
every respect must be produced by similical gregaria, either similical simi-
li or similical differentia; differential similia or differential differentia can-
not produce similical effects. And theretf(Tre if two or more aggregations
come into the homonicial lime and place of an effect, we first find by Keterical
and homonical inductions of aggregations, the aggregations from which the
effect sprung, then we look for other instances containing a simile of one of
the aggregations from which a similical effect sprung, i. e., we vary the cir-
cumstances, and by” doing so we are often able by heterical induction of gre-
garia to eliminate certain gregaria from the differential aggregations combined
with the similia of the other aggregation in the given instance; then we pro-
ceed farther.

And it must be remembered th^ two gregarial simili can not exist in
t'.ie «ame aggregation. Thus; iron possesses hardness, and there is an ho-
monical hardness in this piece and an heterical hardness in that piece,
and inter se the homonical hardness and the heterical hardness are gregarial
similia; but there cannot be two hardnesses in an homonical piece
of iron; all the gregaria in a single piece or particle of iron are inter
se differentia. Now when effects are produced between two aggregatioqs,
these aggregations either disappear in a measure and merge in the
effects, as in chemical compounds, or the effects, which our senses witness
are grounded in one of the aggregations or in both. When oxygen and hy-
drogen unite and form water, the two aggregations, in a measure merge in the
effect — water, i. e., although the weight, impenetrability, &c., of the sepa-
rate elements remain as gregaria of the compound, yet some of the gregaria
of each element seem to have disappeared and to have merged in an effect,
whose gregaria with reference to the gregaria of either of the elements are
differentia; but if we apply oxygen to steel, we witness an effect grounded in
the steel. Having now cleared the way, as we h»pe, we may proceed tox diff-
erential induction.

Suppose then, that we take a certain aggregation, which we will call
A, and that we apply the aggregation B to it, and we find a certain effect x to
spring up; we then in like conditiona, apply to A, or to a simile of A, the aa:-
gregation C, and find either no effect or the effect y, then it is certain, A and A
being hemon or inter se similia in every respect, that the causal gregarium of x existing in b has no simile existing in C, i.e., that each of the gregaria of c and the causal gregarium of x existing in B are inter se differentia. Suppose then, that we can discover in B the gregaria a, b, c and d, for instance, and that we can also discover the gregaria a, b, c and d, in 0, then we know that neither a simile of a, nor of b, nor of e, nor of d, was the causal gregarium, in B or in similia of B, of x, which sprung from the homonical time and place of A and B. And letting the capitals A, B, C, D, &c., be names to distinguish aggregations inter se, and the small letters, a, b, c, d, &c., be names to distinguish effects inter se, we may make the following tables to assist the understanding.

Ist.

B and A produce a
A and C produce b
B and C produce g
A and D produce c
B and D produce h
A and E produce d
B and E produce i
A and F produce e
B and P produce j

A and G produce f &c.

B and G produce k &c.

Now in the first set of instances in the homonional time and place of the effects, if we desire to find the catal gregaria of a, which exist in B, we see that gregaria, similical with the causal gregaria in B of the effect ^, do not exist in C, nor D, nor E, &c., and hence wherever we find a gregarium in C, D, &c, which has a simile in B, we know that this similical gruga-rium in B and the causal gregarium, or each of .the causal gregaria in B, if there should be more than one causal gregarium in B, are inter se differentia. And in the second set of instances we may deal in like manner with the gregaria of A. And after that we have differentiated, by differential induction, as m the manner now explained above, the gregaria in B, which are not the causal gregaria, from the causal gregaria, we may dismiss the non causal gregaria from our consideration and look further into the matter.

The case, however, may and does occur in chemistry, where two aggregations will not produce an effect without a third aggregation being brought to bear upon them, and then differential induction is rendered still more complicated and difficult. Suppose that A, B and C, produce the effect a, and that A and B produce b, A and C produce c, and B and C produce d, then it is evident that the causal gregaria of a existing ii A and each of the gregaria in B are differentia; for, if the causal giegaria of a in A, have simi-lia in B, then B and would produce a without A. And in like manner, it is evident that the causal gregaria of a in A and each of the gregaria in C are differentia, and the causal gregaria of a in B and each of the gregaria in A are differentia, and the causal gregaria of a in B and each of the gre

garia in are differentia. And hence the proximate causal f^regaria of a must be in b and C, or in c and B, or in d and A. Now if A and B really produce no effect at all, and if B and C produce no effect at all, it is evident that the proximate causal gregaria are in c and B. And if c be a permanent effect, we may then deal with C and with B in the manner above given; but if c be evanescent we are not able to manage it in that manner. If nitric acid and platinum in an homonional time and place produce no effect, and if silver and platinum in like conditions produce no effect, but nitric acid dis-olve silver, i. e., nitric acid and silver produce an effect, which we will call c; aud if nitric acid, silver and platinum produce an effect, which we will call a, then it is evident that the causal gregaria of a lie in c and platinum, and we must, if possible, inquire into the gregaria of c and also into those of
platinum by differential induction as explained above.

But suppose, as before, that A, B and C produce the effect a, and that A and B actually produce b, and A and C produce c, and B and C produce d, it is then uncertain whether b and C, c and B, or d and A produce a; and if the effects, b, c, and d be evanescent and not of a permanent character per se, so that we cannot examine them, we can make no inductions respecting the proximate causal gregaria of a. If, however, b, c and d be of a permanent character, when A and B have produced b, we can try b with C, and so of c and d; and in this manner we can differentiate the gregaria of c and d from the causal gregaria of a.

When four elements enter into a compound in a binary manner, differential induction is easy. When A and B produce a, and C and D produce b, and if a and b are permanent effects and they produce c, we may first make differential inductions of the causal gregaria of a in A, and in B, of b in C and in D, and then of the causal gregaria of c in A and in B. But it may be that A, B, C and D contain the still more remote causal gregaria of a; A and B may produce b, A and C produce c, B and C produce d, or the operation may be still more complicated and then the resultant effects produce their effects and the last mentioned effects produce still others, and so on to a given effect x for instance. Organic and animal life is, no doubt, produced in this manner. But however complicated the matter may be, the principle of differential induction in any case has a simile. In every other case, and it may be summed up in the following differential proposition: whatever gregaria being put in the conditions, in which certain causal gregaria produce a given effect, and they do not produce a simile of that effect and the causal gregaria of that effect are differentia.

CHAPTER VTI.

SIMILICAL INDUCTION.

Having treated in the preceding chapter of differential induction we will not find much difficulty in understanding similical induction, and we need not spend much time upon the subject. But in order to assist the understanding let us represent aggregations by the capitals A, B, C, &c., and their effects by the small letters a, b, c &c., and let us form two tables as before:

<table>
<thead>
<tr>
<th>1st.</th>
<th>2nd.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A and B produce a</td>
<td>B and A produce a</td>
</tr>
<tr>
<td>A and C produce a</td>
<td>B and G produce a</td>
</tr>
<tr>
<td>A and D produce a, &amp;c.</td>
<td>B and H produce a, &amp;c.</td>
</tr>
</tbody>
</table>

Now in the first set of instances, as B, C and D, each of them along with A produce a, A remaining the same or a simile of A being in each instance, the respect, in which B, C and D are inter se similia, is the causal gregarium of a, existing in B, in C and in D, &c.; and in the second set the respect in which A, G and H are inter se similia, is the causal gregarium of
a existing in A. And if A and B produce d, and then d and C produce a, we may make a similical induction respecting the causal gregaria in d and in C in the manner shown above. And if A and B produce d, and C and I) produce g, and then d and g produce a, we may continue our intuctions in like manner, and so on.

In differential induction the respect in which aggregations, one of which contains causal gregaria of a given effect and the others not, are inter se similia, and the causal gregarium in the one causal gregarium are inter se differentia; in similical induction, the respect in which a < ggregaria, all of which contain causal gregaria of a given effect, are inter se similia, and the causal gregarium of the given effect in any one of these aggregations compared are inter se similia. And if two aggregations containing causal gregaria of a given effect and compared in the manner above stated by inter se similia only in one respect, that respect is the causal gregarium of the effect existing in each of the aggregations. The principle of similical induction may be summed up in the following similical proposition: whatever gregaria in similical conditions produce similical effects, are inter se similia.

CHAPTER VIII.

INCOMMENSURAL INDUCTION.

We have seen heretofore that, commensura and incoinnieasura are relations which have an homocical standard, and therefore when these terms are applied to aggregate existences, or to gregaria, they are applicable only to those existences, which are inter se similia. Thus: a may be equal to a \( i.e., a=a^*, \) or \( a=a^* \), a and a' being inter se similia; but if a and b be inter se differentia, a cannot be equal to b, \( i.e., a=\neq b, \) and a < b, are propositions without any meaning, just as much as when we say that this sound is equal to that color. Now all incommensural effects are inter se incommensura, by reason of the incommensural relations of time or of space or of both, existing between the aggregation in which the effect is grounded and the other aggregation containing causal gregaria; or else by reason of the incommensural relations between the quantities of the causal gregaria at homocical or heterical times, the times of application remaining commensura, and the spaces between the aggregations remaining commensura. Thus; an hour and a day are incommensural relations of time, and a steady rain for one hour and a steady rain for one day leave incommensural effects grounded in the land from the incommensural relations of their times, the quantities of rain falling in commensural times being commensura. And it is evident that, in heterical instants of time the causes of the effects grounded in the land, the rain which falls, are not homonical but similical; yet commensural quantities falling in commensural times, the effects will be incommensura from the incommensural relations of the times of the similical causal gregaria in operation to produce the sums total of the effects. Again; in the radiation of influences, the effects of those influences will be inter se incommensura from incommensural relations of space, the times, and quantities of gregaria in aggregations, in which the effects are grounded, being inter se commensura. Thus:
If A be a body radiating heat, for instance, a body at a will receive, in commensural times, more of the radiated influence than a similar and commensural body at b, i. e., the effect grounded in the body at a and the effect grounded in the body at b will be incommensurable. Attain:

\[ \text{B} \]

\[ \text{C} \]

\[ \text{1} \]

\[ \text{o} \]

If there be two objects of iron, whose weights are inter se commensurate, attached to the lever A 0, the nm at B and the other at U, their forces exerted upon a body at A will be inter se incommensurate from their incommensural relations of space from the fulcrum. And again; if incommensural relation of time and space, incommensural quantities exert their influences, the effects will be incommensurable.

And we must bear in mind that the incommensurable effects, which are to be the subjects of incommensural induction, are grounded, and witnessed by our senses, in one of the aggregations containing causal gregaria, and our object is to find the other aggregation or aggregations containing the rending causal gregaria. Thus; if A and B at one time produce a, and at a;

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other time A and B produce a', and a < a*, these incommensural effects are grounded and witnessed by our senses, either in A or in B. When oxygen supports the combustion of coal, the effect, which our senses witness, is grounded in the coal. Now, it is evident that, if A and B produce no effect whatever upon each other, they cannot produce incommensural effects: If A or B incommensurate a, A or B must be an aggregation containing causal gregaria. And hence, letting B be the name of similical aggregations, if we find the similical effects, named a, grounded in B, and these effects be inter se incommensurable, we may then look for some other aggregation, A for instance, and make observations or try experiments with A and B, and by incommensural induction determine whether or not A contain causal gregaria of a. Thus; commencing with incommensural relations of space, suppose the effect a grounded in B to be incommensurated when B approaches or recedes from A; if now the position of A in relation to other aggregations be changed, i. e., if the other aggregations among which A is situated, be heterated by changing the position of A or of B, and a be incommensurated when B approaches or recedes from A, then it is evident that A contains causal gregaria of a. That the earth contains causal gregaria of the gravitation of terrestrial bodies towards its center is evident by incommensural induction. On the opposite sides of the earth at the same time, the same stars contain between them and the earth one set of terrestrial...
and the earth is between those stars and an other set of terrestrial bodies, tiie
gravities or effects grounded in both sets of bodies become incommensurable at
incommensurall distances from the earli's surface.

In the foregoing example we have seen that, from the incommensurall
relations of space between aggregations containing causal gregaria incommensurall
effects arise. Incommensurable quantities or intensities ot caual
gregaria, their times and spaces remaining commensurall, produce also incommensurall
effects. If a barometer be placed under the receiver of an air
pump, and the quantity of air be increased and again diminisijed, and such
incommensurable quantities be attended with incommensurable effects upon the
barometer and the influence of all other objects be heterated from the
homonial time and place of the effects, it is evident that the pressure of the
atmosphere is the cause of such effects. And hence when effects grounded in
certain aggregations are incommensurated and we can perceive by observa
tion, and still more when we can we can make the experiment, that the quanti-
tities or intensities of gregaria in some other aggregation are corelattively
incommensurall, and we can also heterate other objects, we may be assured
that the correlative incommensurall are connected with the effects by
causation.

And again: the relations of time may enable us to make incommensurall
induction of the causes of incommensurall effects. All hough we can

not in one day or in one year perceive any material change in the falls of
Niagara, yet other objects being heterated, and the water continuing to flow
over from year to year and very gradual changes continuing to take place
and being incommensurall in incommensural times, other things being equal,
from the incommensural relations of the times of the flowing and of the
wearing away of the rock, we can infer the water to contain causal gregaria,
in the absence of other experience.

The principle of incommensural induction may be stated in the fol-
lowing incommensural propositions: The relations of the times of causal
gregaria to incommensural effects, spaces and quantities being commensurall,
are incommensurall; the relations of the spaces of causal gregaria to incomm-
mensural effects, times and quantities being commensurall, are incommensurall;
and the relations of quantities of causal gregaria to incommensural effects,
times and spaces being commensurall, are incommensurall.

CHAPTER IX.

COMMENSURAL INDUCTION.

We have seen in the previous chapter that, incommensural effects, time
and quantity, depend upon incommensural relations of spaces or of quan-
tries between the causal gregaria; and, on the other hand, commensural
effects, whose times are commensurall, depend upon commensural relations of
quantities or of spaces between the causal gregaria. And we must always
bear in mind that, not an homonial gregarium but heterical gregaria are
the causes of all effects, and that some of the causal gregaria are contained
in the aggregation in which our senses witness the effect grounded, and some
of them in some other aggregation, for which we are seeking as the cause of
the phenomenon, when a magnet attracts iron-filings, some of the causal
gregaria are in the maTae and others in the filings. And it is quite evident that,
if we represent the quantity of the causal gregaria existing in a certain magnet by A, and the quantity existing in a certain piece of iron by b, and the iron of the weight of be attracted through a certain space A in the time d, a magnet containing cA will attract iron containing 2b and of the weight 2c through the space A in the time d. If twelve pounds weight attached by a cord will raise twenty pounds upon an inclined plane through the space A in the time D, every-four pounds in like manner will raise forty pounds. And as in incommensural so in commensural induction, we must look to the relations of the effects, which we witness, and then to the relations of times spaces and quantities of other aggregations to these effects. And we have already remarked that, neither incommensural nor commensural induction has any reference to kinds of effects, but that on the contrary the effects, whether they be inter se commensura or incommensura, are always inter se similia.

Suppose then that by observation or exoeriment we find, first by a homodical induction, A and B to produce a in the space b in the time c, and in other parts of space we find a simile of A grounded in a simile of B; we must then look to A or for some simile of A, in the respect of the causal gregaria of a existing in A; and in order to determine which object is this simile of A, we must examine the quantity of causal gregaria in A and in B, and their relations in B, and also the quantity of gregaria in the simile of B, in which we witness the effect, and the relations of this simile of B in space with ether objects. And if we find an object, which we may call y, whose relation to the simile of B in space is commensural with the relation of A to B, times and the effects, a and a' being commensura, so far y is indicated as containing causal gregaria of a'. And if now by a change of spaces we can heterate other objects from relations similical with the relations of A to B, we can then fairly conclude that y, contains causal gregaria of the effect a'. The principle of commensural induction may be summed up in the following commensural propositions: The relations of space between the causal gregaria of commensural effects, times and quantities being commensura, are inter se commensura; the relations of quantities of the causal gregaria of commensural effects, times and spaces being commensura, are inter se commensura; and the relations of times of the causal gregaria, of commensural effects, quantities and spaces being commensura, are inter se commensura.

CHAPTER X.

INDUCTION PBOMISCUOUSLY.

From what has been said in the previous chapters in this book, it must appear that in making inductions we use for the most part two cases at least, in which the aggregations are not homonial hetera, but homonial and heterical hetera. Thus: if we wish to make an heterical induction of the aggregations A, B and C, which in one instance we find to be in the homonial time and place from which spring the effect Z, we look for another instance of the effect Z, in whose time and place A nor a simile of A is not present: and in this latter instance, we do not find the homonial B and C, but we find similical B and C. And hence all induction proceeds upon the truth, that the laws of nature are uniform, or that similical or commensural causes in like conditions always produce similical or commensural results: and this truth, as we have seen heretofore, h established in our minds by the homonial syllogism. And in order to make even heterical inductions, we must have experience gained by observation or experiment, and this experience depends upon the powers of the mind to recognize homon, hetera, similia, clifferentia, commensura and incommensura. We find by experience, for instance, that a
certain piece of soap will not cleanse any object, with which it does not come in contact; and if now we call this certain piece A, by the homonical syllogismi a simile of A will be conditioned in a similar manner; and hence if we find

an instance of cleansing in whose place a simile of A was not present, we make the heterical induction that A is not the cause of cleansing in this instance, and not a sine qua non of such effects. Heterical induction of aggregations, indeed, goes no farther than the particular instance from which a certain aggregation has been heterated. If, for instance, A, B and C are the only aggregations present when the effect Z comes into existence, and supposing A to have been a cause of Z, in this particular instance, we know by heterical induction, that R was not a cause of the homonical Z, but for all that we do not know that R, if in the place of A, would not be a cause of a similical Z. For the causal gregaria existing in A may have similical gregaria existing in R, and hence R would also be a cause of such effects as Z.

Heterical induction of aggregations does no more than remove from an instance of a certain effect, certain aggregations as sine quibus non, and thus clear the way for further investigation.

Homonical induction proves directly causation in the instance to which it is applied; but the homonical induction of aggregations, ai thought it prove a certain aggregation to be a sine qua non of a particular effect, yet it does not prove similical aggregations to be sine quibus non of effects similical with that particular one. Thus, if we find the aggregations, A, B and C in the time and place from which spring the effect Z, and by observation or experiment we find B and without A in a similical time and place, and no effect follows, we can conclude that A was a sine qua non of that homonical Z, but we can not conclude that similia of A are sine quibus non of similia of Z. For although A and D as aggregations may be differentia, yet the causal gregaria of homonical Z existing in A may have similical gregaria in D; and hence D also will contain causal gregaria of similia of Z. Arsenic, copper and lead, as aggregations, are inter se differentia, yet in some respects they all contain similical gregaria, and hence each of them is a poison. And though by homonical induction of aggregations we prove a cause of similical effects, yet we do not prove the only cause. But if we can make an homonical induction of gregaria, we will prove the only causes of similical effects. It is very seldom, however, that we are able to obtain the data, either by observation or experiment, from which we can make an homonical induction of gregaria, and in order to make inductions of gregaria we are obliged to resort to differential and similical inductions.

In differential induction, which presupposes homonical induction of aggregations, we look directly at the gregaria of aggregations, and having applied these aggregations severally to a common substance, or to substances entirely similia inter se, we note the gregaria, which are inter se similia in two substances, one of which along with the substance A for instance, will pi`uce the effect Z, while the other along with the substance A will not produce a simile of Z, and then we differentiate these similia from the causal

gregaria. Sugar and soda, for instance, will both dissolve in pure water, these capacial gregaria of the two substances are inter se similia; but when vinegar is applied to soda it will foam and boil, while when applied to sugar it will not; the capacial gregarium of being held in solution, therefore, is not
in soda the cause of the ebulition witnessed when it is put into acid. In the
first book of this volume we spoke of facial and capacial gregaria; we called
the color, the taste, the feeling, the smell and the sound of objects, their facial
gregaria, because they present such appearances to our senses. In reality,
however, all these things are capacial gregaria; and the only difference is
that facial gregaria are perceptual facts immediately noticed by the mind,
while our knowledge of what we have called capacial gregaria is derived
from a comparison of perceptual facts. Thus, if I apply sugar to my
tongue an effect is produced immediately between the sugar and my organs
of taste; but if I put a lump of sugar in water, I see the sugar and the water
and I may see the sugar dissolving; I, indeed, make an induction in ever3''
Instance to arrive at the knowledge of capacial gregaria of aggregations.
Now in making differential inductions, we always arrive at the knowledge of
similical ejgregariain various substances 'by observing the facts which spring
from them when applied to similical substances. Thus, supposing our or-
gans of taste to remain in similical conditions during a certain time, and
during this time we taste two substances and ^nd their tastes to be exactly
alike: if now we find the one when taken into the stomach will act as an
emetetic and the other as a cathartic, we feel assured that the qualities, tho
gregaria which are similia in regard to our taste, and the gregaria, which
produce in the stomach differential effects, must be inter se differentia. And
so we may try any two or more substances with pure water or with an' other
thing, and in this manner determine similical gregariai, and if then we apply
these substances to some other thing and find differential effects, we may
differentiate the similical gregaria from the causal gregaria of a given effect.
Differential induction does not, indeed, determine what gregaria are causal
gregaria, but it merely determines what gregaria are not causal gregaria.
And this it does not only in respect to a j^articulor instance
but in respect to all instances of similical effects. In the compli-
cated workings of nature, however, laws are frequently antagonistic,
and when one prevails over another, the prevailing one must always be
considered the cause of the ensuing change which takes place, while the
abrogated law, as it were, is not the cause although it is often called so. And
in order to make the subjects of differential and similical induction clear, it
is necessary to speak of this matter here. If, for instance, two men with
rope and pullies be raising a rock and the rope break and the rockAill to the
ground, we are apt to say that the breaking of the rope is the cause of the
rock's falling, while in truth the causal gregaria of the rock's falling are in

the earth and rock, and the rope has nothing to do with it; though the rope,
before it broke, was a cause of the rocks rising. Every change, indeed, is an
effect, and when a certain positive phenomenon is going on it is being or has
been produced by certain causes, some of which may cease to act and then the
phenomenon disappears, in which case we are accustomed to call the cbssas-
ti:ion of the cause of its production, the cause of its disappearance. We are
acustomed to say that the want of water is the cause of the death of a fish
up on the land. That, however, which is heterated, the absence of a thing
the want of an aggregation or gregarium, can not be the cause of anything.
Certain laws may be kept in operation by certain gregaria of aggregations^
and then certain phenomena exist; take away one of the aggregations, the
taking away of which is truly an effect, and although we may properly call
this taking away of the aggregation the reason of the cessation of the phe-
nomenon, yet it is not the cause of such cessation. That only which acts
can be a cause. And hence although there may be and is plurality of causes
of similical effects, i. e., the causes of similical effects are hetera, yet simili-
cal effects can not be produced by differential causes. And hence, although many aggregations, which as aggregations are inter se differentia, may produce similical effects, yet when we come to the causal gregaria of similical effects, liee causal gregaria will always be similical. And therefore, the causal gregaria of similical effects being inter se similical, we at once know that, of two aggregations, one of which produces the effect and the other not, the gregaria which are inter se similia and the causal gregaria are inter se differentia.

In similical induction we compwe together different aggregations, each of which we find to contain causal gregaria of similical effects to ascertain in what they agree. And if they agree but in one respect, this respect we know must be a causal gregarium: for the causes of similical effects are inter se similia If they agree in several respects, we can not tell which of the similia are causal gregaria, and we should try by differential induction to differentiate some of these similia from the causal gregaria. Thus: if A, B, C and D will, each of them, with G produce similical effects, and if they all agree in several respects so that we can not tell the causal gregarium in either of them, we may find an aggregation in which some of the gregaria existing as similia in A, B, C and D, exist also, and yet the aggregation along with G will not produce the effect. That crystal ine structure is not the causal gregarium of the double refraction of light is clearly proven by differential induction, although all substances which have hitherto been found to cause the double refraction of light, have been crystal ine; and therefore, if we knew that they did not agree in any other respect, by similical induction, it would be proven, that double refraction depended upon crystal ine structure alone. Crystaline structure may, indeed, be one of the causal gregaria existing in all substances, which refract light in this manner; but it is either not a cause at all. or at best it is not of itself the cause, since all crystaline substances do not cause double refraction. Differential and similical inductions aid each other in the search after causes, and neither of them should be neglected in any case, if they can be applied.

Incommensural and commensural inductions also aid each other in science. That the oscillations of the pendulum are caused by the earth, i. §., that the earth contains causal gregaria of these oscillations, and also that the earth contains causal gregaria of the gravity of terestrial objects, was proven by incommensural induction; and then Newton by commensural induction proved the earth to contain also causal gregaria of the motion of the moon, and established what is called the universal law of gravitation. It does not seem to me to be necessary to speak farther upon the six methods of making Inductions which we have endeavored to exhibit in the previous pages. These six methods of induction with the aid of ratiocination exhaust the powers of the human mind in drawing logical conclusions. And whilt treating of our subject in the first book, we saw that hetera lie at the foundations of knowledge and that homon is at the foundation of propositions; and we must now see that homon is at the foundation of all induction and that the homonical syllogism, sustains the truths upon which ever induction proceeds.

But before passing on to further considerations it seems necessary to make a few remarks upon the methods of induction which have been set out by J. Stuart Mill, and in doing so we will not go into a lengthy discussion, as we believe that the student who has mastered the preceding pages of this book, will be able with but few suggestions, to perceive, what we consider,
the errors of Mr. Mill. Of Mr. Mill's method of Residues, we shall merely remark that when we have subducted from any phenomena, what by previous inductions and ratiocinations we already know to be due to known causes, we proceed with the residue by some one or other of the six methods, which we have given, and that there is nothing peculiar to his method of residues, so that it should be considered in itself a particular kind of induction.

In what Mr. Mill calls the method of agreement there is the mixing together and confounding of what we have called heterical induction with similical induction. The axiom upon which Mr. Mill considers this method to rest, to-wit: "Whatever circumstances can be excluded, without prejudice to the phenomenon, or can be absent notwithstanding its presence, is not connected within the way of causation," is applicable only to heterical induction, yet Mr. Mill endeavors to apply his method of agreement to infer causation from the agreement in respect to the presence of some antecedent.

Mr. Mill's method of Difference corresponds with what we have called homonical inductions, though his exposition of it has not been satisfactory to our mind. What Mr. Mill calls the Joint Method of Agreement and Difference, we regard as an intermixture of homonical induction with erroneous views, which indeed, have reference to differential induction, although Mr. Mill had no conception of such method. It is, indeed, quite evident, that if A will produce a certain effect and B will not, the causal gregarium existing in A have no similia existing in B, and if now we could examine every substance which will not produce the given effect and find that they all agree in not containing some gregarium which is contained by A, there would be a strong probability, and nothing more than a probability, that this gregarium was a cause of the given effect. To pursue such a method, however, would be to depart from true induction and in the labyrinths of nature it is entirely impractical, and of very little value could it be done. On the other hand if we have but two cases, in one of which the effect springs from A, B and C, while in the other, viz: A and B, the effect will not be produced, although we may never be able by experiment to remove and again replace C, yet the two cases furnish all the data necessary for making the homonical induction that C contains causal gregaria of the effect. We conclude that there is nothing in Mr. Mill's Joint Method to make it a particular kind of induction and further that a great part of his doctrine respecting it is erroneous.

Of Mr. Mill's method of concomitant variations, we will only say that he does not make any reference to what we consider to be the true principles involved in the matter, but treats of cases, some of which are to be determined by commensural and others by incommensural induction.

We have been very limited in our remarks upon the methods of Mr. Mill, as we desire in this book to take the affirmative and not the negative side of questions. Our object is to build up and not to tear down. And we propose also to make this book as concise as possible and not fill and enlarge it with criticisms. We may dismiss the subject of the inductive methods here, hoping that the reader will be able to understand the matter.

CHAPTER XI.
HYPOTHESES.

In the previous pages, we have dealt only with those principles which are brought into view by the comparisons of truths which have been derived from actual facts. And in the investigation of nature, our object must always be to find out what actually exists and how it operates, and not to assume certain hypotheses and from them determine how nature should exist.

operate. He, who would gain any scientific knowledge of the phenomena of nature, must investigate and not make assumptions. When we have really gained any new truth in nature, we do not rest the evidence of that truth upon an hypothesis; but in regard to all certain knowledge, we apply the saying of Newton "Hypotheses non fingo." Yet it is natural for man to form theories, and these theories often direct his energies towards valuable results. And for the purpose of stimulating the mind to investigation an hypothesis may be laid down, and in many instances for that purpose an hypothesis must be resorted to. No man, whose object is to search after truth, will take the trouble of investigating anything unless he expects to find out whether something which he has in view be true or not. A scientific hypothesis, therefore, is a subject stated for debate, in which arguments pro and con can be brought from actual facts in nature. If by ratiocination and induction founded upon actual phenomena, the hypothesis can be proven, that closes the debate and the hypothesis is converted into a truth, the evidence of which does not at all rest upon the hypothesis. And hence when we have laid down an hypothesis, our object must be to prove or disprove it from actual phenomena. But from nature we can prove only homon or homa, hetera, similia, differentia, commensura and incomensura; and therefore, scientific hypotheses may be divided into homonical, hetera, simical, differential, commensural and incommensural hypotheses.

In heterical hypotheses, which seem to be the most convenient to be treated of first in order, we may make a supposition respecting the heterical existences of a phenomenon; or granting its homonical existence, we may lay down an heterical hypothesis respecting its causal grescario as sine quibus non of certain effects. Thus: as a simple example of a supposition respecting the heterical existence of a phenomenon; suppose we see a certain horse in an enclosure to-day, and to-morrow we see a horse in another place so much like the former that we are uncertain whether it be the same horse which we first saw, we may make the heterical hypothesis that, it was not the same one, i.e., this horse and the one we first saw are hetera, and then we must look for the evidence to prove the hypothesis. And if by investigation we find that the first horse has been continuously and is now in the same enclosure, we have proven the hypothesis to be a truth, whose evidence does not rest upon an hypothesis, but upon actual relations of time and space. And a similar example might be given to illustrate homonical hypotheses respecting the homonical existence of a phenomenon: we need not, therefore, speak of this again under the head of homonical hypotheses. But suppositions respecting the causes of phenomena are also useful to excite endeavors, and we may make heterical hypotheses respecting causation. If the aggregations A, B, C and D be in the homonical time and place from which springs the effect R, we may suppose, for instance, that D is not a sine qua non of the B; and to prove our hypothesis we find another instance of the effect R,
from which D was absent in time or space. And again: respecting causal
gregaria, if the aggregation A. along with Z will produce a given effect, and
B also along with Z will produce a similar effect, and we can perceive that A
possesses gregaria, which B does not, we may heterate those gregaria con-
tained by A, but not by B, from the causal gregaria of the effect produced by
A and Z, and thus prove the heterial hypothesis respecting those gregaria,
if we have made ene. And we have already, no doubt, gone far enough to
see that heterial hypotheses respecting the existence of any phenomenon,
to be worth anything, must be susceptible of proof by simple heteration, and
that heterial hypotheses respecting causation must be proven by heterial
induction.

Homonial hypotheses also respecting causation must be proven by
homonial induction; and until they are so proven, they are not, of course,
to be received as really true, however useful they may be in stimulating in-
quiry. Homonial inductions, indeed, are best and more frequently made by
experiments than by observations upon nature in her undisturbed processes
offered gratuitously to our senses, and therefore we would more frequently
resort to experiments to prove any homonial hypothesis. If, for instance, we
should suppose that, it is the equal pressure of the atmosphere upon un-
equally balanced columns of water, which force the water up the shorter arm
of a syphon, we could make experiments from which an homonial induction
of the real cause could be brought out and the hypothesis proven. That there
is an ether pervading all space and causing light by its vibrations, however,
can not be proven by homonial induction, and if ever proven, (and without
being proven the hypothesis amounts to nothing) it must be proven by simil-
leal induction. An homonial induction can not be made in any such case, unless
the existence of aggregations containing causal gregaria can first be proven.
If, for instance, we suppose that the aggregations A, B and C, produce x,
when we do not know, whether or not, A really has an existence, we can
make no homonial induction in the case; for although we should find that
B and C alone will not produce x, that is no evidence of the agency or exis-
tence of A in the former case. Homonial hypotheses respecting causation,
to be useful in increasing our stock of knowledge must be susceptible of
proof by homonial induction. And no hypotheses respecting the existence
of an aggregation containing causal gregaria can be thus proven.

We may also make differential hypotheses respecting causal gregaria,
and for their proof we must resort to differential induction. We might, sup-
pose, for instance, that the quality of dissolving upon the tongue and the
causal gregaria of the taste in common salt are differential (tm by examin-
ing other substances containing this quality, we could prove our hypothesis.
And in the examination of nature, as differential inductions, though they do

not prove what the causal gregaria are, assist very much in making similical
inductions, so differential hypotheses should be assumed and tried that we
may have every help in unravelling natures complications.

In similical hypotheses we assume that, the causal gregaria of certain
phenomena, whose causes we wish to ascertain, and the gregaria of certain
objects, with which we are familiar, are similia: and if their effects can be
shown to be inter se similia, we prove the hypothesis. Thus; if we find a
particular color upon white paper, we may assume that the aggregation
whatever it might have been, containing causal gregaria of such effect, was
similar, in respect to its causal gregaria, to some object with which we are,
familiar; and if the object with which we are familiar will produce upon the
same kind of paper the same kind of color, we prove the hypothesis. If all the planets contain the quality of attracting iron, they, each of them, possess gregaria similar to the lode stone. And if we could make ourselves certain of the existence in any place, of an ether, whose vibrations would produce light, we could prove the ethereal hypothesis.

Respecting incommensural effects, we may make three suppositions, viz: first, that the times and spaces being commensural, the increase of the quantity of gregaria in a certain object incommensurates the effects; second, that times and quantities being commensural, the incommensural effects depend upon incommensural relations of space; and third, that spaces and quantities being commensural, the incommensural effects depend upon incommensural relations of time. And having made our hypothesis, we must then find the proof by looking into circumstances varied in these respects, and in which the effects occurs. But in making our hypotheses, these hypotheses must have reference only to what object or objects contain causal gregaria of the incommensural effects, which we witness. And we have remarked several times already that, in the cases from which an incommensural induction can be made, we are to deal only with similia, commensura and incommensura being relations inter similia. And the hypotheses above spoken of must be proven by incommensural induction. After having ascertained that certain objects contain causal gregaria of given effects, we may make hypotheses respecting: the relative increase or decrease of the effects to the times, spaces or quantities of causal gregaria. But these hypotheses can not be verified by induction, and unless they can be verified by mathematical calculations, they are merely guesses. We are frequently obliged to make mathematical calculations respecting the laws of variation in the effects depending upon incommensural spaces and times. That gravity varies inversely as the square of the distance is not an induction, but a truth found out by the application of mathematics to actual phenomena. That the spaces passed over in successive commensural times by falling bodies are in the relation of the odd numbers 1, 3, 5, 7, &c., is a truth of the same kind, i.e., it is found by making calculations of what actually occurs, as observed, in this respect, when bodies fall without being impeded.

By respecting commensural effects, we may make hypotheses in the same manner as respecting incommensural effects, and we must seek for the proof in like manner. We do not consider it necessary to make further remarks upon hypotheses. Every hypothesis respecting causation must be proved by induction; hypotheses respecting the relations of quantities, times and spaces are to be dealt with by ratiocination.

We have now completed our view of ratiocination and induction, so far as we propose to treat of them in common language. And we may well consider of what value these speculations may be to the cause of science. And merely as a speculation we regard the previous pages as not entirely unworthy of study; but we hope yet to show, that practical results of the grandest kind may be expected to follow from a knowledge of the principles therein set forth. To gather up an exhibit these principles in formNs, and to apply them to the actual phenomenon of nature will be our object in Book III.
CHAPTER I.

SIGHS IN Ratiooiniltion.

In the two previous books we have examined the foundations of reasoning throughout and have endeavored to explain, by the use of common language, what we have considered necessary on the subjects of ratiocination and induction. Common language, however, is not the appropriate vehicle of recondite science. Without the assistance of symbols, which form a peculiar language, Algebra, which consists of syllogisms with commensural and incommensural propositions, could not have been brought to any great perfection. These commensural and incommensural propositions, with the syllogisms constructed upon them, however, have been expressed and wrought into Algebraic formulae, which can be transformed in various ways, and thereby unexpected and grand results can be brought to our apprehension. And it may be useful to inquire whether the other four kinds of propositions also can not be expressed in symbols and reduced to formulae, which may be formed into a complete system of abstract and exact science. That such complete system of science may and will be constructed in the future by the genius of man, the author of this treatise believes; and it seems to him to be not an unworthy undertaking to make a beginning at its construction, which may be an incentive to call to the work others of mere favored circumstances and greater learning. The construction of such system will, therefore, be attempted in this book. And we will commence with simple propositions.  

Let the sign $\%$ stand for an homonical comparison; then, $\%om$, will be equivalent to the proposition in common language, $a$ and $a$ are homon. Let the sign $v$ stand for an heterical comparison; then $ava$ will be equivalent to the proposition in common language, $a$ and $a$ are hetera. Let the sign $||$ stand for a similical comparison; then $a||a$, will be equivalent to the proposition in common language, $a$ and $a$ are similia. Let the sign $k$- stand for a differential comparison; then $aH-b$ will be equivalent to $a$ and $b$ are differentia. Let the sign $=$ stand (as in Algebra) for a commensural comparison; then, $a=a$ will mean that $a$ and $a$ are commensura. Let the signs $=>$ and $<$ stand (as in Algebra) for an incommensural comparison: then, $a>a$, or $a<a$, will mean that $a$ and $a$ are incommensura.

Now by the use of the foregoing signs, we can combine the six kinds of propositions in all the figures and modes of the syllogism. Thus in mode 1st:

$aAa$ or $aAa$
$Ii$ or $H-.$
$a'Aa'$ or $a'Ak$
$\ldots a II a'\ldots ahha'$.

And these syllogisms will be true irrespective of time and space, i.e., if $aAa$ or if $ava$, or if $a||a$, &c. to-day, they always have been and always will be in a like comparison, so far as time and space, as agents, are concerned.
But before proceeding further, it is necessary to explain the manner in which simple grei^aria of aggregations by the use of signs. Let the first large letters ©f Alphabet, A, B, C, &c., stand for aggregations, and the first small letters, a, b, c, &c., for gregaria, then a syllogism in mode 1st may be thus constructed:

a of AAb or, a of AAb
II or, H-

a of Bab or, a of Bac
.-.a of A II a of B. or. .'.a of AH-a of B.

Now if a stand for the gregarium — color, we may interpret the syllogism thus:

Color of AAb or. Color of AAb
II or^ H-

Color of Bab or, Color of B Ac
.-.Color of A II color of B. or, .-.Color of Ah- color of B

And these signs as above given are sufficient for all the purposes of the singular syllogism and of the singular homonical syllogism.

But for the purposes of the Plural syllogism, we wish signs, not only to express the comparison between the terms of the propositions but to show also the comparisons between the existences exhibited in each term. And for this purpose, we need but combine the signs already given, and reading from the left to right, interpret the sign on the left hand as an adjective and the succeeding sign as a noun. The following table will show the use of the signs:

Let the sign, A A, indicate homonical homa.

" " " AV " " hfctera.
" " " A ll " " similia.
" " " A If- " " differentia
" " " A:- " " commensura.
" " " A< " " incommensura.
" " " V A " " helerical homa.
" " " V A " " hetera.
" " " V II " " similia. ^ I
" " " VH- " " differentia, ed by Lj00gle
" " " v- " " commensura.
" " " v< " " incommensura.

Let the sign, || A indicate similical homa.
indicates the comparison between the terms of the propositions. Thus; in the equation, \( a+b=:\star +b \), the sign \( ^\wedge \) expresses the comparison between \( a+b \) and \( a+b \); but if \( a=:\star b \), then the expression \( a+b= =a+b \) means, not only that we have an equation, but also that the existences exhibited on each side of the equation are inter se commensura i.e., each existence on one side of the equation sign, has a commensura, fellow on the same side and on the other side of the signs.

Now with the lorcgoiag signs, we may from cemplete syllogisms in all the figures and modes. And commencing with the\(^\wedge\) first four kinds of propositions, let two dots (\( ** \)) indicate that the existences, between which they
are placed, are merely grouped together by comparison; and let AB, without
dots between them mean as in Algebra, and also the signs -f- and ^ as in Al-
gebra, and the following paradigms will show the plural syllogism.

PLURAL SYLLOGISM — PARADIGM IST.

V
V

'I i II
I! fi-
ll =
IK
H-A
K-V
H-Ij
H-H-
H- =
H-<

= 11

< V
< A
< II
< H-
< =

The left hand sign

Mode Ist.
II 11
C.DaaA'B'
..A..B II CD.

Mode 2d.
A..B vv A'.B'
• AA
C..DVVA..'B'
•.A..BVVC..D

Mode 3d.
B..B II ii B'..B'
A A
CD. II i|B..'B'
.B..B. II II CD.

Mode 4th.
A..B.i4-t+CD.
AA
E..F. H-K-CD.
•.indefinite.

Mode 5th.
A..BaAA'..B'
A A
CDVAA'..B'
,.a..bvacd.

Mode O'h
A..BAAA' ..B'
A A
•CD II AA\..B'
•.A..BlI aCD.

Mode 7th.
A..BaAA'..B'
CDh-aA'..B'
.A.Bh-A^--D-

Mode 8th.
A..BVVA'..B'
A A
CDaVA'.B'
••A..BVVCD.
Mode 9th.
A..BvVB'..B'

AA
C..DII VA'..B'
-.indefinite.

Mode 10th.
A..BVVA'..B'

W
a.DH-VA'..B'
-.indefinite

Mode 11th.

A..BII

CD A
-.A..BI 11

|A'..B'
A A
|A'..B'
II CD.

Mode 12th.
A..BII HA'..B'

A A
CDv 11A'..B'
-.indefinite.

Mode 13th.
A..BII |(A'..B'

^ A A
CDH^nA ..B
-.A..BH- 11 CD.
The first paradigm shows the plural syllogism, with the first four kinds of propositions; in the following paradigm the first two and last two kinds of propositions will be combined.
A A
CD= =B'..B'
••.B..B= =CD

Mode 4th.
A..B<<CD
A A
E..F<<CD
-. indefinite.

Mode 5th.
A..BaaA'..B'
CD ^ A A' A
••A..B V A CD.

Mode 4lh.
A..BAA A'..B'
A A
CD=AA'..B'

Mode 7th.
A..BAAA..B'
cd<aa'..B'
••a..b<acd.

Mode 8th.
A..BVVA'..B'
CD aV A'..B'
-.A..B V V CD.

Mode 9th.
A..BVVA'..B'

Mode 10th.
A.BVVA'.B'

C..D=V'A
Mode 11th.
A..B==A'..B'
A A
CDa=A'..B'
..A..B= =CD.

Mode 12th.
..A..B= =rA' .B'
A A
CDv=^A'..B'
.".indefinite.

Mode 13th.
A..B==A'..B^'
A A
C..D<r<^A'..B'
..A..B<^C'..D.

Mode 14th.
A..B<<CD.
A A
E..FA<CD
..A..B< <f E..F.

Mode 15th.
A..B<<CD
Now in mode 1st, of paradigm 1st, since AaB, the first premise reduces to A\A; and as CAD and A' AB', the second premise reduces to C\ A'; and hence the conclusion will be A || C. And in mode 1st of paradigm 2nd, for similar reasons, the conclusion will be A=C. It must also be observed that, it is their homonical relations inter se in space, which makes A A B, while their times heterate. We have already shown heretofore, that the homonical A to-day and the homonical A to-morrow have heterical points of time, and they may have heterical wheres, one to-day and another to-morrow. But for the present we will suppose that, the aggregations, with which we are about to dial, are in and continue in a state of absolute rest; thea, they will not change their WHERES-in space. Now with the use of the signs already adopted, we may bring the relations of time and space into our propositions and exhibit them along with the aggregations or gregaria. Let T stand, not for time, but for times between which there may be a comparison, and let S stand for spaces in like manner; the, the proposition A A A', in order to exhibit the relations of times and spaces may be written thus:

T S.

AAA':

Which proposition may be put into common language as follows:--
The homonical A, having an heterical time but an homonical space with A', is homonical with A'. And we may state the first premise of the plural syllogism in Mode 1st thus:

VV AA

T S.

A ... B A A' ... B'.
And this proposition may be stated in common language as follows:--
A and B, whose times are hetera and spaces homon, having heterical times but homonical spaces with A' B' whose times are hetera but spaces homon are homonical with A' and B'. And with the signs and letters as they are now understood, as we hope, the following four propositions may be expressed:

(1.) (2.) (3.) * (4.)

VV AA VV AV VV VA VV VV
In the above proposition the times have reference to the temporal relations between A.B.A'B.B and the mind of the thinker, i.e., to the relations between the objective aggregations and the subjective conscious truths. And we can easily see that a rose blooming on the tree and the tree itself have an homononal time; but the rose will fade and pass away, while the tree may yet remain, and hence the times of the rose's existence and of the tree now are hetera. And the times of the aggregations—exhibited in the above propositions—are considered in their relations, not inter se, but to an ^ther existence, the consciousness of the ego. But if we consider those aggregations in their relations of time inter se without any reference to any other thing, the above propositions will be reduced to the following:

(I)
A A
T. S. T. S.

(II)
A v
T. S.

(III)
A v
T S.

(IV)
AA vv
T.

8.

A. AVB. AVA'. A..BVVA'.B}'.
Now if we reduce the premises in modes lat in like manner as the propositions last above given, we will have:

7\8.

(a.)
2d. premise

^A

1st., premise
A. C.

And by the comparison of these existences viz., A and C, we must draw the conclusion that:

(b.) (c.) (d.) (e.)

^J.^^' U.flU UflU u^u

AUG. A H- C. A = C. A <or>" C.
The premises in mude 5th reduce as follows:

(f.)

T. a
A.

^ ^ A V A A
T. S. T. S. T, a

And as

T.8.
in the first premise and _'_ in the second premise

A,

are homon i.e.,

and A makes the conclusion

\[ A A A A A^*A \]
\[ T.a T.S. T. 8. \]

AAA,

\[ A A ^*^ A A \]
\[ T.S. T.S. T. 8. \]

A V C.

the comparison between

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The premises in modes 8 reduce as follows:

(i.)
\[ A V A^VV ^V \]
1st. premise, T. ». T. S. T 8.

A..B V V A'..B',

A V Ay

2d, premise _I_1 ^*^ _j11 as A..B and CD are

A'..B', CD

(i.)
\[ A A \]

horaonical hetera, andas T.S. T. S. T. 8.
therefore the conclusion, T. S. T. S.

V --->!

A..B V V CD.

Now propositions either (3) or (III) underlies the conclusions in modes 1, 5, 6 and 7, and proposition either (4) or (IV) underlies the conclusions in rattles, 2, 8, 4, 8, 9, 10, 11, 12, 13, 14, 15 and 16; for, similia. differentia, commensura and incommensura are also hetera. Our knowledge of hetera and consequently of homon depends upon time and space, but our knowledge of similia, differentia, commensura and incommensura does not depend upon time and space, but upon the gregaria of aggregations. And these substrata of our knowledge are to be inquired into from other grounds.

CHAPTER II.

SIGNS IN INDUCTION.

In heterical induction of aggregations, we find two or more instances of similical effects, and we use one of the instances to eliminate some of the aggregations from the sine quibus ncm in another instance. The aggregations of the two or more instances may be synchronous or they may not be. An observation made in the time of Homer, if correctly made, is as valuable for one of the instances, as one made to-day, although the aggregations which came under observation then, may have passed away into other forms. And in making experiments, the times of the experiments are not homon but hetera. But the aggregations brought together in any one instance of an ob-
And as $x$ and $x'$ are similical effects, they can be produced by similical hetera and in order to have similical hetera bo nomine etin numero, we must dismiss D in the first term from the skie quibus noM0f the effect $x$. We may then find another instance «nd have the proposition:

\[ \text{\^} \cdot \text{i.} \]

\[ \text{\^} \cdot \text{s'} \]

\[ \text{A''..B''} \]

\[ \text{\vspace{1cm}} \]

\[ \text{\vspace{1cm}} \]

\[ \text{\vspace{1cm}} \]

\[ \text{\vspace{1cm}} \]

\[ \text{\vspace{1cm}} \]

\[ \text{\vspace{1cm}} \]
And this proposition enables us to heterate C. The heterical induction of gregaria may be represented in the same manner. Take the proposition

(2.)

A .. B

V V∗
T. S.

A A

Y V
T. B.

C .. B'

a..b..c..d e..f..g.h
X

a..b..c. e..f..g..h
U

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X'

9-

Now as B II B', they will contain a like number of Bimilical gregaria and hence by looking at 0, d can be eliminated from the causal gregaria in A.

Homonical induction is the reverse of heterical induction. Take the proposition respecting nggregal ions:

(3.)

A A V V A A

T. S. T. S. T. S.
Now as we desire to have similical effects, i. e., x and x', they must be produced by similical hetera, eo nomine et in numero, and by looking at the terms, we see that A must be added to the second term, i. e., that A was a sine qua non of the effect x. *

In differential induction we first clear the way as much as possible by heterical induction of jjfrcgardia and then take the proposition:

(4.)
C. ,B'

a..b..c..d i.k.&c. .

V V
T. S.

a.

.b..e..f i..k..«&c

v.

n
X
H-

0. or V.

C, we should have had similical effects; but as the effects are differentia, their causal regaria in A-.and in C are differentia: and hence the similical gregaria in A and 0 may be differentiated from the causal graria, i. e., a and h and the causal gregaria of x in A are differentia.

Similical induction is the reverse of differential induction; take? the proposition. *'

10r

\

(5,)-
Now as X II x', they have been produced by sirailical grtgarias, and as B II B', we must find similical gregkria in A and C, and we find a and b in both; therefore t)[m&$ p gregaria, or one of them at least is a <5au)ial gregarium.

We must n)tice, that in «ur pr.opositious for making heterical and homouical indudtieas, w« rejiresent the aggregations by the fligns between the terms, merely as heiera. This mutt necessarily be the case; for, we are
eliminating and aggregating hetera by '^hosu processes. In differential and
similical inductions also we must represent the ag-gregations by the Bigna,
merely' us hetera. For, if A..B

U

........ .... x- '")

ani^ A tl B) wtt kn^w by ratioeol nation. that stmilioal similia will pro^c^ mrni-
Heal (effects; and if AH-B, we know, that similici^l diiterjeatia will p^^duce
similical efiects. But in the above inductive iiji:opositiona^ BJl B' and Ah-C,
as aggregations, and we desir<»o find in A and C, the respects, the gregaria
inter se similia and to make an inference respecting them and this can ho
done only by using the heterminical signs between the terms.

Im incommeusurl induction, there are three cases; 1st, times and spaces
being commensura, the quantities are inoom measura ; 2d the times and quan-
tities being conmaensura, the spaces are in^ommensura; 8d .the spaces and
quantities being commensura, the times are incommensura. Let us suppose
that we witneas the eft'ect in B and B', then :

(6,)

A V
T. S.

= V = V
T. 3.

A'V
T. 3. ,

A..B

' T.B.

: A%ft' "-" ^ •••

X,, <

Digitized b^JLjOQgie

11
(7.)

\[ A \\leq V \]
\[ T.S. \]

\[ = V < V \]
\[ T, 8. \]

\[ A \\leq V \]
\[ T.S. \]

\[ A \leq B \]

\[ = V \]
\[ V \leq V \]
\[ T.S. \]

\[ > \]

\[ A' \leq B' \]

\[ X \]

\[ , \ x' \]

(8.)

\[ < V = V \]

\[ U. \]
\[ T. S. \]
Commensural indaction brings a simile of one of the aggregationi, in which we have determined by incommensural indaction to contain causal gregaria of a given effect, an\^ some other aggregation, about which we are uncertain, into relations commensural with the relations between the aggregations, which we now to contain causal gregaria of such effects. And these relations are threefold, hence:

(9.)
\[ x \neq y \]

T. S. T. S. 4^8.

\[ A.B = V \theta B' \]

\[ U V V 2f \]
- T. 8. -
\[ X \ldots = X' t \]

Which proposition brings C and B' into commensural relations with the relations of A and B, and when that is done we find the commensural effect, and hence, as B \mid\mid B', we conclude that C contains similical gregaria with A. If we should take the second term of proposition (8,) as the first tonn of an inductive commensural proposition we will have:
If we cannot thus bring the aggregations, which we are investigating, into commensural relations as above, and find commensural effects, we may yet frequently, by mathematical calculations, find what would be the effect, if such commensural relations were realized; and this will answer the purpose.

CHAPTER III

HKTBRICAL IVDUECTION APPLIED.

In the two previous chapters, we have given formulæ, which, when carefully considered and fixed in the mind, will assist the understanding in investigating nature. Observations and experiments must furnish the data, but the inferences to be drawn from those data must be dictated by a sound philosophy. And the formulæ, which we have given, will not only aid the mind in making proper inferences, but also in looking for the kind of instances, from which alone legitimate inferences can be drawn. And in applying the foregoing principles, it will not be necessary for us to bring the cases noticed into the exact form of the formulæ, as the reader, who has mastered the subject, can easily do that for himself. We wish merely to show the utility and importance of the subject, by illustrations from cases in which these principles have led to scientific discoveries, though the investigators, perhaps, were entirely ignorant of the processes heretofore explained. And it will not be necessary to furnish many illustrations to show what may be expected to follow from a thorough knowledge of these processes by the scientific men of the world, who are engaged in the several departments of science. Our illustrations may be taken from any department of Knowledge
for our principles apply to every branch of science. We will commence with heterical induction.

Among all the varieties of material forms, which surround us in the world, chemists have been able to find fifty-five elementary substances, i. e. Substances whose particles are inter s© si m ilia. And from some or other of these elements, mineral compounds, vegetable organisms and animal organisations are produced. Now nature’s laboratory can be entered, in the first instance, only by induction; we cannot commence with the simple elements and reiwno a priori, or a posteriori, without first having made ind»

tioQS. There is no evidence, about which we at present know anything, to establish any belief, that what now are called elements; are really compounds; and when we find the number and kinds ©f elements, which, from any compound, or organization, we conclude, that we have all the sine quibus non, and because none -other are present, i.e., liy heterical induction. But because a certain number and kinds of elements are found in certain instances, or even in all insiaaces known tq us, we are nwt certain that each one of them is a sine qua non of the given effect; although this false kind or reasoning per enuraerationem simplicem is still empilpyed by writers upon the physical scieices. " " "

In the organ ucHt1^ns , ef. animals we tind an. animus or life pirincij^le, vis vitce^aad thU principle has bf^en said to possess and ei^ert a :f(i^pe sui generis upon the elements and to impart to them, when taken into the stom- ach, an unusual action. And although this life principle exists in all ani- mals, yet the theory respecting ite /orce on the elements ft.nd it is nothing bet a theory) has recently been disproved in a measure at least in the most satisfactory manner by heterical induction. It has beoH shown that hard boilerd albumien and muscular fibre can be dissolved by adding a few drops of muriatic acid to a decoction of tlialeigh stomach of a dead calf, precisely as in the stomach of a living animal. This one instance heterates the vim vitre from tlie sine quibus non, and leaves the stomach i.j act ut>on chemical prin- ciples in dissolving the food; and if the known principles of chemical trans- formation do not yet sufficiently account for digestion, it must be further inquired into. Physiologists have also attributed the formation of formic acid, oxalic acid, urea &c., in the body to the force of the vis vitaeB; yet each of these can be formed in the labratry of the chemist, and consequently it is proved that vis vitae is not a sine qua non. True heterical induction thus dispells mystic theories and opens the true road lor inquiry.

Ohșni^istg hjave contende<i1 th`t vegetable tibiae in a state of decsiy, which », called humu8< is absorbed by plants and is necessary to their growth; yet this humoi can be separated by heterical induction. For, although this butnim is present im most soils, yet "pliuats thrivCt" as we are informed by Dr. Leibig, "in powdered charcoal, and may be brought to blossom and bear fruit if exposed to the influence of the rain and atmosphere; the charcoal may be previoosly heated to redness. charcoal is the most 'indifferent' and most >lmctoDge(kUe euhstaace known ; ft may be kept for centuries without change and is, therefore, not subject to decomp`nsition."' Kow one suck case, as jiieet ciited from Dr. Leibig, who reasons more philosophically than most chemistsy completely heterates the absorption of humus from the sine qtiibns B0&. Leibig ciontends further, that humus merely furnishes carbonic acid for the atmosphere surrounding the roots an^ stalk of the plant, and that tbl
carbonic acid is a sine qua non. This, liowevfer, cannot be proved by heterical indution, which is the only subject that concerns us at present.

We find that several kinds of opium contain maconic acid, and from the examination of such kinds alone without a true philosophy by which to test nature, we would erroneously conclude maconic acid to be a sine qua non of opium as a nnaodyne and soporific"; but there are other specimens of opium, which do not contain a trace of this acid, and yet tby produce similical effects. By heterical induction also, we establish the truth, that volition and the mind's command of the nervous apparatus are not sine quibusnon of nutrition in animals. For, in those parts of the body, which have been paralyzed and which, therefore, are destitute of feeling and not subject to the mind's control, nutrition still proceeds without interruption. Oxygen may be condensed into a liquid by pressure, in which state it possesses those gregaria, which distinguish a liquid from a gas; and yet in either state its actions upon other substances are inter se similia; and those distinguishing gregaria some in the one and some in the other state, can be heterated from the causal gregaria of the effects of oxygen. We need not illustrate further.

CHAPTER IV.

HOMONICAL INDUCTION APPLIED.

We have heretofore observed that heterical induction docs not determine causes, but merely clears the way so that homonical induction can be made more easily applicable to any given case. Now we find that animals having lungs respire the atmosphere, and so long as respiration continues, the circulation of the blood and life and heat exist, but let respiration be prevented and death ensues; by homonalical induction, therefore, the atmosphere is one of the causes of life and heat in such animals. And upon examination of the atmosphere, we find it to contain frequently carbonic acid, water, some earthy matters and oxygen and nitrogen. The earthy matters, carbonic acid and water can be removed from the causes of the effects of respiration by heterical induction; but if we remove the oxygen, these effects immediately cease, and hence it is certain that oxygen is a sine qua non. And by heterical induction we can remove all elements from the sine quibus non of the growth of mammalia excepting those contained in milk; for the health and growth of the young may be promoted by milk alone. Now we find milk to contain caseine, a compound containing a large proportion of nitrogen; sugar of milk, in which there are large quantities of oxygen and hydrogen; lactase of soda, phosphate of lime, common salt and butyric acid. Is each of these elements a sine qua non? A horse may be kept alive upon potatoes, in which the quantity of nitrogen is small, but he does not thrive, and if deprived of all food containing nitrogen, he dies. Mammalia cannot live without a salt, nor can any one of the constituents of milk be wanting for any great length of time without; i marked influence upon the lealh of the animal. Experiments showing such truths furnish the data for homonalical inductions. Plants Cannot grow it either hydrogen or carbonic acid be wanting, and hence, tllese are sine quibus uon.

And acjxiu, we see that if the blood be taken from animals, the immediately die; that blood is a sine qua nou, is thierefore evident. We see also by heterical induction that food taken into the stomach is not a sine qua non
to the life of the foetus; nor is the respiration of atmosphere; but after birth both these things by homonical induction are sine quibus non. Now blood is composed of fibrine and serum, and each of these has been analysed, and they are found to be isomeric, i.e., the constituents of the one and of the other are not only similical differentia, but also by weight commensural in-commensura. It has been found also that if the blood be deprived of any one of its constituents, the health suffers; each one, therefore, by homonical induction is a sine qua non. We can prove also by homonical induction that light is a sine qua non of the growth and health of vegetables; for, other things being equal, they will not develop in dark cellars or eaves. Most plants contain organic acids in combination with bases such as potash, soda, lime or magnesia; and hence it has been concluded, (but it is only probable and not an induction) that an alkaline base is a sine qua non of the growth of plants. The way to prove it is to make an experiment and have all other things, found in the soil and atmosphere where the plant grows well, present excepting these bases; if the plant will then not grow, we have made an homonidal induction.

In many of the sterile soils on the coast of South America, crops of grain will not grow at all: but if guano be put upon those soils, they then yield abundant crops; here is an homonidal induction respecting guano. And certain soils, which are entirely barren, may be rendered fertile by putting quick lime upon them. Soils also destitute of alkalies and phosphates will not grow certain plants, but if these be added, the plants then thrive upon them; here is an homonidal induction. Homonidal inducences respecting the necessary constituents of soils for raising plants may readily be made by comparing a productive with a barren soil. We take the following analyses from Dr. Liebig's agricultural chemistry. A, represents the surface soil; and B the subsoil. One hundred parts contain:

A. B.

Silica in C(, e silicious sand 95,843. 95,180
Alumina 0.600. 1,600
Prato :ide and peroxide of iron 1,800. 2,200
Peroxide of manganese • a trace.'
Lime in combination with silica r-- 0,088. 0,455
Mang: 3ia in combination with silica. . . ; P'1^B^y. y. ^V^.PV o(X)6. 0160
Potash and 8(00 QQo 00^'

IC

Phosphate of iron , ^C-1^^- '••^
Sulphuric acid . . 0.002. a trace
Clorite 0.006: -0001
Humus soluble in alkalies . : . . . . 1,000. 0.000
Humus insoluble in alkalies . . . . . . 050. , 0.000
100,000. 100,000

The above analysis soil was characterised by its great sterility. White clover could not induce to grow upon it; it, therefore furnishes one of the cases necessary for an harmonic imitation. In the following "analysis we have:

A. B.

Silica and tine sdicious^ saud..... 94,t24 ,97,340

Alumina 1,638 0.806*

Protoxide and peroxide of iron with manganese 1,960. 1,301

Lime 1,028. 0.095

Manganese ^ a trace. 0.095

Potash and soda 0.077. 0.112

Phosphoric acid .'. 0.024. 0.015

Gypsum .'. 0.010. a trace

Clorine of llie salt 207. a trace

Humus 512. 0.135

' . - 100,000. 100,000

The above soil produced luxuriant crops of lucerne and. sainfoin and all other plants whose roots penetrated deeply into the ground. Now from these two cases^, it would appear that in those plants receiving their nourishment from the subsoil, humus was a sine qua non; while gypsum is indicated as a sine qua non. in the surface soil. . . ,» , .

It will lake duosoluar fibriue, wlm.h contains water, and leX it \)e exposed to ;i moist atm(»phere, putrifactjon takes pi ac^^i but if the,filirine, be dried and when expicsed lo a diy atmogmphre, no such result takes plac,j\ Hence water or hydrogen, is a sine qua non ot' tUfit putri faction, 8o,ralSi0 yeast, wlnn completely diy, possesses, no power to procluce" feimentatjtf/i]. Now yeasi possesses a soluble and an iuksolnbie 3iibstauc<3, -.^ndJh^, iiiasoliihle substance may be th*-owa out of the fviue quibus Hon. of fcrmepatitou ,jl)v iieterical induction; but the soluble pt^rt when exposed Do thq atmosphere prmluces fermentation, but when the atmosphere is excluded no such result takes place. An aqueous infusion ^f yeast, may l?e mixed with a. solution of Hugar and preserved in hermeticaJly sealed ves.sels witJUout undergotj`g the slightest chaige, t)ut if exposed to the atmosphere fermentation immediately begins. Hence the soluble part of yeast and the atmosphere, are proved to be sine quibus/m of the fermeatation which ensues in such <jases,. Seve*)rJ k.nds of vegetable fibre,. if kept secluded from oxy^geu or hydrogen,. dp ^lyt decay, but when oxygen and hydrogen are present decay commences; eac1K^f

These/^herefo^e, is a sine qua nod of such decay. ()ther bodies do not decay
wi^hoMt the presence of a free alkali, and in such cases alkali by homonical induction is a sine qua non. The juice of grapes expressed under a receiver filled with mercury, which completely excluded the air, did not ferment; but when the smallest portion of air was admitted fermentation immediately began. Animal food and vegetables may be kept for years without fermentation, if the air be completely excluded. We have gone far enough to illustrate the manner of making and the utility of homonical inductions. Any one of the cases of induction given above may be stated in the manner of formulae (3), in Chapter II. The only difficulty in arriving at conclusions, which may be confidently relied upon, lies in obtaining the precise, data needed; if these can be had our conclusions are infallible.

CHAPTER V.

DIFFERENTIAL INDUCTION APPLIED.

We have seen in the previous book, that the homonical induction of aggregations only proves a certain aggregation to have been a sine qua non of a particular effect, but from this case we can am. infer by ratioication that this particular aggregation, or a simile of it must be a sine qua non of all similical effects. For, as there shown, two aggregations, as aggregations may be differentia; and yet in the respect of the regarium, which in one of the aggregations has been a cause of the given effect, the two may be inter se similia; and hence the necessity of differential and similical inductions. This matter has been sufficiently explained heretofore. Now if we take a vff w of the elementary gases, we will see by differential induction, that those gregaria, which distinguish gasses from liquids and solids, are not the causal gregaria of the peculiar action of any gas upon another substance; for, in these distinguishing gregaria all agree. By differential induction we know, that the pectiliar action of oxygen upon iron, for instance, is not owing to the distinguishing gregaria of a gas; for if it were, nitrogen would produce upon iron a similical effect. The chemical action of liquids and of solids may be treated in a like manner. Each element possesses a chemical gregarium sui generis; and by differential induction we may frequently draw so near to this gregarium, which is a cause of certain effects, as to leave no doubt of the causal gregarium, though differential induction does not directly determine causes. Complete differential inductions of all the elements would lay the foundations upon which chemistry might be made a deductive science; which may, as we hope, be accomplished in the future. But for the illustration of our present subject, we must proceed with such data its experimentalists have furnished. And we may commence, not with the differential Induction of elements, but of compounds. One element may not exert some pecnlinr force without the presence of another or others, which is compounded, and then this peculiar compound, is the sine qua non of a given effect. This is owing to the circumstance, that compounds possess capacial gregaria, which, with reference to the gregaria of either of the elements entering into them, are differentia. We may begin our illustrations, therefore, by differentiating compounds. And as by analysing composite substances, they are resolved into simple differential compounds, we may assume, for the sake of illustration, that each of the simpler compounds, into which a composite substance can be resolved, exerts its gregaria unimpered when in the more complex substance;

Now according to Brandes, rhubarb contains: Rhubarbic acid; Galic acid; Tannin; Sugar; Colouring extractive; Starch; Gummy extractive;
Pectic acid; Malate of lime; Gallate of lime; Oxalate of lime; Sulphate of pottassa; Chloride of pottasium; Silica; Phosphate of lime; Oxide of iron; Lign in; Water. And if by differential induction we are in search of the purgative ingredient of rhubarb, we may differentiate water by a comparison of rhubarb with the juice of the sugar cane, both contain water, they agree in this respect; we may differentiate lignin by a comparison with almost any woody fibre; the oxide of iron and silica by a comparison with the water from wells and thermal springs; phosphate of lime by a comparison with bone dust chloride of pottassium by a comparison with sea-AVater; the sulphate of pottassa by a comparison with potashes; the oxalite of lime by a comparison with wood-sorrel; Gallate of lime by a comparison with jujub-nuts; the malate of lime by comparison with vegetables such as the house-leek; Tannin by a comparison with the bark of oaks; sugar and starch by comparisons with wheat flour and maple saps &c. As the above compounds can be separated, we could use heterical and homonical inductions, and that is the better way, for, it relieves us from making an assumption at the outset which may not be true; but for the sake of illustration we have used differential induction. If we wish to find by differential induction in what the poisonous gregaria of morphia consist, we may analyze this compound and we find it to contain carbon, hydrogen, oxygen and azote. We can differentiate the carbon by the comparison with fat beef or pork; the hydrogen and oxygen by a comparison with water; and the azote by a comparison with gluten or indigo. And hence it appears that neither of these elements per se is the cause of the poisonous effects of morphia, but that the causal gregaria arise from the compound. There is in this induction, however, the same assumption, which we made, when treating of rhubarb, and though, we think, we are at liberty to make such assumption for the sake of conveying to the reader's mind the application of a principle yet in the actual search after truth, such assumption is inadmissable. We must deal with morphia, therefore, not by its ingredients, but by its gregaria.

Now morphia among othera contains the following gregaria:

19

MorPHTA-. - It is fusible at moderate lu-af; it burns with a red and very smoky lauiui; it is soluble in 80 parts of boilin.2: anhydrous tilcohol; it is soluble in 500 parts of boilini>- water; ii is insoluble, in cold vwater; it is insoluble in ether; ii is iusoluble in oil; it is insoluble in chloroform; it forms salts with acids.

We will assume that the above data are correct, though chemists differ respecting some of the gregaria, The f jllowinir are some of the greguria of starch a non-poisonous substance:

Starch!- It is insoluble in cold water; it is insoluble in cold alco-hol; it is insoluble in ether; it is insoluble in oil.

The following are some of the gregaria ol resin a non-poisonous substance.

KESIN.-Jt is fusible at mocleralf; heat; His insoluble in water; it is translucent; it burns with bright flame and very much smoke.
Now, if we compare morphia with these last two non-poisonous sub-
stances we will see that several of their gregaria are inter se similia; these
gregaria, therefore, may be differentiated from the poisonous gregaria con-
tained in morphia, and further investigation must be had.

Again; we know that common salt, chloride of sodium, is an antiseptic
and when applied to fresh flesh it prevents decay; we may inquire therefore,
respecting the causal gregarium of this phenomenon. Now among the gre-
garia of common salt are the following:

Salt. — It has a white color; it has a saline taste; it undergoes but
little change in a dry atmosphere; it dissolves in water; it dissolves but little
in alcohol; it melts by heat; it is decomposed by carbonate of polai.--a.

With common salt we may compare Epsom salts, sulphate of mag-
nesia, among which others contains the following gregaria:

Epsom Salts.— It has a white color, it has a saline taste, it undergoes
but little change in a dry atmosphere, it dissolves in water, it dissolves but little
in alcohol, it melts by heat, it is decomposed by carbonate of potassu.

Now the similia may be differentiated from the causal gregaria and
the matter must then be further inquired into. We have gone far enough
with our illustrations to see that true differential inductions can be obtained
only from the comparison of gregaria. And any one who will examine
the matter, will find, that in what Bacon would call the history of substances,
chemical science is yet very defective. We need further experiments to be
made under the guidance of a true philosophy.

CHAPTER VI.

SIMILICAL INDUCTION APPLIED.

As historical induction clears the way for homonical induction—

differential induction prepares the way for similical induction. And both
differential and similical inductions to be satisfactory must be based upon a
great number of gregaria, which requires a very extensive knowledge.

MuRi. Tic Acid. — It is a colorless liquid, it has a sour taste, it corrodes
animal tissues, it is incompatible with metallic oxides, it is incompatible with
alkalies, it redes litmus paper, it has a strong affinity for water.

The following are some of the gregaria of Sulphuric Acid:

SuLPHUiiic Acid.— It is a colorless liquid, it has a sour taste, it corro-
des animal tissues, it is incompatible with metallic oxides, it is incompatible
with alkalies, it redes litmus paper, it has a strong affinity for water.
For the purpose of differential induction we may compare with the above acids tho acetic acid of commerce, a substance which may be taken in large quantities without poisonous effects. Some of the gregaria of acetic acid are ns folh^vvs:

Acetic Acid.— It is a colorless liquid, it has a sour taste, it is incompatible with metallic oxides, it is incompatible with alkalies, it reddens litmus paper, it has a strong affinity for water.

Now if we differentiate the similical gregaria of acetic acid from the poisonous gregaria contained in sulphuric and muriatic acids, we find the latter two acids to agree in their gregaria of corroding animal tissues. And by similical induction this corroding gregarium is a causal gregarium of the poisonous effects; it produces the direct destruction of the organs with which it comes in contact, and hence death ensues.

There is another class of poisons, which do not corrode or immediately destroy the organs with which they come in contact, but by their action they render the tissues incapable of performing their functions. Of these we may compare the salts of lead and of copper.

The following are some of the gregaria of the carbonate of lead:

Carbonate of Lead. — It is a white solid, it is insoluble in water, it is soluble in acid, it is soluble in alkali, it enters into firm combination with animal tissues.

The following are some of the gregaria of what is commonly called verdegris, the carbonate of copper:

Carbonate of Copper. — It is a green solid, it is insoluble in water, it is soluble in acid; it is soluble in alkali, it enters into firm combination with animal tissues. i oooif'

For purposes of differential induction we may compare piffe indigo with the above:

Indigo.— It is a blue solid, it is insoluble in water, it is soluble in acid, it is soluble in alkali.

After differentiating we find carbonate of lead and copper to agree in the gregarium of entering into firm combination with animal tissues; and vital organs thus rendered calous and inflexible can not, of course, perform their functions, and hence death must ensue. We do not, however, give the above as satisfactory inductions; the data are insufficient and some of them may not be correct. Chemists have not been familiar with the inductive processes and they have not looked forlata in view of making differential and similical inductions, and hence they have not furnished us with the requisite ground-works.

As another case to illustrate the principle of similical induction we may inquire into the causes of the double refraction of light. Some of the gregaria of the carbonate of lead, which substance causes double refraction, are the following:
Carbonate of Lead. — It is a transparent substance, it is of crystalline structure, its crystals are of the rhombohedral form, it is insoluble in water, it is soluble in acid, it is soluble in alkali.

The following are some of the gregaria of Iceland spar, another substance causing double refraction:

Iceland Spar. — It is a transparent substance, it is of crystalline structure, its crystals are of the rhombohedral form, it is insoluble in water, it is soluble in acid.

The following are some of the gregaria of one species of diamond, which causes double refraction:

Diamond. — It is a transparent substance, it is of crystalline structure, its crystals are of the rhombohedral form, it is insoluble in water, it is soluble in acid.

With the foregoing double refracting substances we may compare the following substances, which do not refract light in that manner. The following are some of the gregaria of a species of diamond which causes single refraction:

Diamond. — It is a transparent substance, it is of crystalline structure, its crystals are of the octohedral form, it is insoluble in water, it is soluble in acid.

The following are some of the gregaria of pure rock salt:

Rock Salt. — It is a transparent substance, it is of crystalline structure, its crystals are either of the cubical or octohedral form but sometimes prismatic, it is insoluble in water, it is soluble in acid.

The following are some of the gregaria of pure borax:

Borax. — It is a transparent substance, it is of a crystalline structure, its crystals are either of the prismatic or octohedral form.

Now after using differential inductions we find the substances causing double refraction to agree in having their structure made up of a rhombic form.

And from this it would appear that the form of the crystal causes double refraction; but our data are again insufficient for a satisfactory induction. There are fourteen different forms of crystals entering into the structure of diamonds and only two of which, the octohedra and cube, so far as we can learn, cause single refraction. The subject needs further examination with more full and more certainly correct data. Fresnel explains, deductively, double refraction by assuming that the ether in double refracting substances is not equally elastic in all directions. This is, of course, merely an hypothesis, and the evidence by which it can be inductively proven is not furnished by double refracting substances. Newton concluded, probably per enumerationem simplicem, that combustibility was in some way a cause of refraction and then reasoning a posteriori he conjectured that water and the diamond would be found to contain combustible elements; and his conjecture has been verified. But we have gone far enough to illustrate the principle of similar induction.
CHAPTER VII.

INCOMMENSURAL INDUCTION APPLIED.

We have seen, heretofore, that there are three cases of incommensural induction, having reference to three kinds of relations between the causes and their effects. And if we commence our illustrations with incommensural quantities of certain objects, which we are examining for the purpose of determining their relations to certain incommensural effects, we will soon see the utility of this method from the daily necessities of life. On making our fires in the stove, we need but admit a small current of air and then a greater one to convince us, by incommensural induction, that the atmosphere is connected, in some manner through causation, with the combustion going on in the stove. And we need but increase the inhalation of oxygen into our lungs to find out, that certain phenomenal effects in our system are dependent upon the respiration of this gas. The incommensural quantities of the sun's rays falling vertically and obliquely upon equal areas in different latitudes, must also convince us of their relations through causation with the earth's temperature and vegetation. And in every branch of agriculture, horticulture and floral training, the case of incommensural inductions from the relations of quantity may be made by a little ingenuity. I extract the following facts from Prof. Liebig's agricultural chemistry: "The employment of animal manure in the cultivation of grain and the vegetables which serve for fodder to cattle, is the most convincing proof that the nitrogen of vegetables is derived from ammonia. The quantity of gluten in wheat, rye and barley, is very different; these kinds of grain also, even when ripe, contain this compound of nitrogen in very different proportions. Proust found French wheat to contain 12.5 per cent, of gluten; Vogel found that the Barbanan contained 24. per cent; Davy obtained 19. per cent, from winter and 24. from summer wheat; from Sicilian 21. and from Barbary wheat 19. per cent. The meal of Alsace wheat contains, according to Boussingault 17.3 per cent, of gluten; that of wheat grown in the 'Jardin des Plantes' 26.7 and that of winter wheat .3.33 per cent. Such great differences must be owing to some cause, and this we find in the different methods of cultivation. An increase of animal manure gives rise not only to an increase in the number of seeds, but also to a most remarkable difference in the proportion of the substances containing nitrogen, such as the gluten which they contain.

In another case of incommensural induction, we have seen that, ceteris paribus, the spaces between an object containing causal gregariaudthe incommensural effects are incommensural; and we will now proceed to give a few simple illustrations of this case. It is said that Galileo, perceiving that the chandeliers suspended in a church, when set in motion, vibrated long and with uniformity, was led by these phenomena to invent the pendulum. With this instrument a great many persons have since experimented; and the phenomena of its vibrations are found to be incommensural in different latitudes.
and localities. A pendulum of about 39 inches which vibrates seconds in the latitude of New York, will not vibrate sixty times in an hour of con-
mensural time (m the equator; and there is a marked difference in the time of the vibrations of the same pendulum in the valleys of the Amazon and on the high peaks of the Andes. The farther you remove the pendulum from the earth's center of gravity, the fewer will be its vibrations, ceteris paribus.
And hence we learn from these incommensurral relations of spaces between the earth and. the incommensurral effects, that the earth contains causal gregaria of these phenomena. Again: The surve3'or, from the incommensurral relations of spaces between his comimss and a certain hill and incommensurral variations of the needle from the true meridian, concludes that the hill possesses causal gregaria of these variations. The incommensurral relations of the spaces, between the moon and the waters on different parts of our earth, and the tides, furnish also the data from which to make incommensurral in-
ductions; and although the tides, on the opposite side of the earth from the moon, might seem at first thought, to destroy the force of these data, yet when

we reflect that the earth is interposed between the moon and those tides, the data remain in their validity. The reader will understand that in incom-
measural induction from incommensurral relations of space, we are seeking merely for some object which contains causal gregaria of the incommensurral effects; no matter what may be the characters in other respects, of the in-
commensurral effects in their relations inter se. Thus: if we try the positive ly electrified end of a cylinder with the knob of a charged Leyden jar and find the cylinder to be repelled, and then we try the negative pole of the cylinder and find phenomena of an opposite character, by incommensurral relations of space and the incommensurral effects of each kind inter se, i.e., incommensurral similae both these sets of phenomena, though inter se differentia, described proved to have a dependence upon the knob of the jar, i.e., the knob contains causal gregaria of both these sets of phenomena.

We will now give a few illustrations of the case in which incommen-
surral inductions can be obtained from incommensurral relations of times. If we should find ore by the side of a mountain a ledge of iron ore which had been uncovered for but a quarter of a century, and on the same mountain we should find ore, which had been bare for several centuries, and we should make comparisons between the two, we would be able to draw, from the in-
commensurral effects perceived in the ores, conclusive incommensurral inductions of the cause from the incommensurral relations of times, had we never thought of the cause before. For, granting that all other things are similical and commensural in the two sets of phenomena excepting the times of ex-
posure to the atmosphere, and the quantities of' atmosphere being commen-
sur in commensural times/ no object whatever, excepting the atmosphere could have incommensurated the effects witnessed in the oxidized ores. A hound by instinct as we call it, makes a kind of inverse incommensurral in-
duction concerning incommensurral effects from incommensurral relations of time or we, at least, may make it for him, when he is pursuing the trail of a deer. Each tread of the deer deposits in the soil a certain effect, and these effects immediately after the treads in similical soils are, no doubt, very nearly commensurral inter se, and which the atmosphere with the soil comences to diminish, leaving at incommensurral intervals of time from the point from which they were made incommensurral effects. When the hound, therefore, strikes a l'atJheroid track, not having a scientific knowledgeof the relations of time, space and velocity, and no means, in the present case, of judging of the last, he ia not very animated in the pursuit, not expecting to find the deer for some time, although it may have lain down within forty rods from the point.
where lie. struck the trail. But as he moves on, he perceives incommensura; he then increases his spfeed, and finding the degrees of the incommensura, or differences, to increase rapidly, he becomes warm and l^oisterous, proclafm-
iag as he goes the state of lii« expectations, in relation to time of coming

with the cause of these iDcommensural phenomena. Should a man buy two pair of boots inter se similla, and walk in one pair over a given road for six hours a day for two months, and then in lilce place and manner walk in tile second pair for four months, and observe the incommensural effects and times, he would not hesitate to make an incommensural induction. We need go no further with illustrations.

It must have been noticed by the reader that when we are consideriD^^ incommensural effects inter se, our comparisons have reference to nothinn^ else than quantity, I. e., the effects inter se are quantitively incommensura. It will be noticed too, that drops of water inter se commensural falling at in-
tervals of one second for one year, and commensural drops falling in like manner for half a year, produce incommensural effects from the incommen-
sural quantities of cause. And when an aggregation exerts from itself in-
fluences through space, as in the radiation of heat for instance, an object nearer and one more remote from the focus of influence, providing the objects be inter se commensura, will receive incommensural quantities of the influence in commensural times. And hence, laying aside the interference of causes, the quantities of causes and effects are proportional. The assertion that effects are proportional to their causes, however, must not ^^ understood to mean that such is the case absolutely and without limit, as we will better understand hereafter.

CHAPTER VIII.

COMMENSUKAL INDUCTION APPLIED.

Commensural like incommensural induction deals only with effects, which are inter se similia. And we take a certain case, in which we have heretofore determined a certain object to contain causal gregaria of a specific effect, and having determined the time space and quantity in this ■ case, we endeavor to ascertain what objects, over which we may have no control, con-
tain similical gregaria with reference to such similical effects, from the rela-
tions of the time, space and quantity of the case in which the object is under our control to the time, space and quantity in other cases of similical effects in which the objects containing causal gregaria are not under our control. And in commensural as in incommensural induction there are three cases. Let us commence our simple illustrations with the commensural relations of space. Suppose, for instance, we had made experiments with a certain ^vory ball and found that when we let this ball fall forty feet upon iron ef a smooth surface, it rebounded a certain number of feet; when we let it fall' upon marble in like manner it rebounded a certain other number; and when upon brass in like manner it rebounded a certain other number; and when upon rebounding of the ball is the effect in the ball witoessetl by us, of which the space through which it rebounds is the quantum: and some of the causal
gregaria of this effect are in the ball and the others are in the objects upon which it fell. Suppose now, after this, we find a mass of metal, of a kind unknown to us, underlain with granite and we let the same ivory ball fall upon its smooth surface forty feet and observe its rebounding, and we find this effect to be commensural with that obtained when it was let fall upon marble; then as the ball is the same and other things are equal, the commensural relations of the spaces fallen through by the ball in the two cases to the commensural effects, convince us by commensural induction, that this new metal contains, in the respect to these similical and commensural effects similical and commensural causal gregaria with those contained in marble. And should this new metal be so situated that we could not approach to it so as to examine it closely with our eyes or feel it with our hands and the ball used be an heterical one, bat similical and commensural with the first, the result would be the same. Again: Suppose we make experiments with a certain magnet and find that if we attach the one end of a small string to the north pole of a magnetic needle placed at a certain distance from the magnet and the other end to a weight, which the magnet, when the magnetic needle is at right angles to it, will just be able to draw on a certain surface until the needle points directly towards the magnet, this drawing of the weight then may be taken as the quantum of the effect: if we now take a piece of are and situate the needle with weight attached on the same surface as before, and a commensural effect is produced, we conclude by commensural induction, having our eye on the commensural relations of the spaces in the two cases and times being supposed commensural, that the magnet and ore contain similical and commensural causal gregaria. Again; if we make a fire in a stove and hold a thermometer at a certain distance from it and read the degrees to which the mercury rises in a given time, this rising of the mercury will be the quantum of the effects; if then we go to a heap of quick lime with water thrown upon it and covered up with earth, and we place the thermometer at a commensural distance from it and find the quantity of effects to be inter se commensural, we conclude that the heap contains similical and commensural gregaria, respecting such effects, with the stove.

Second Case.— If we take the down of the goose and find that a certain quantity will be attracted through a certain space in a given time by the prime conductor of an electrical machine, and we then take a commensural quantity of the down of the swan and find it to be attracted through the same space in a commensural time, we conclude the latter substance to contain similical and commensural causal gregaria with the former. If a weight be attached to a balloon and the balloon then ascend a given distance in a certain time, and we then attach the same weight to another balloon and the second one make the same distance in a commensural time, the two balloons contain similical and commensural gregaria.

Third Case. — If we charge a certain Leyden Jar to its capacity and measure the space through which a spark from the knob can be made to pass so as to ignite sulphuric ether and then we discharge a spark of the jar commensurally charged through the same space into ether of alcohol and find commensural effects, times being equal, we conclude the two ethers to contain similical and commensural causal gregaria with reference to such effects. We need not illustrate farther. If the reader will bear in mind that all effects are produced by heterical causal gregaria, some of which are in the objects in which we witness the effect, and some in another object, numerous examples, from which commensural inductions can be made, will suggest themselves to his own mind. And it is evident that if we can not always find commensural relations, we may yet make our inductions in many
cases by the commensural relations of mathematical ratios. By taking a piece of iron, for instance, to incommensural distances from the earth's surface and finding the ratios of its weights and distances, we find that gravity varies inversely as the square of the distance; we find also that the matter tends to move in straight lines with a force equal to its weight multiplied into its velocity; and therefore, near the surface of the earth if we project a stone of a certain weight in a horizontal direction with a given velocity, we can calculate the distance it will make through space in falling to the earth by gravity. Now if we contemplate the moon and find its ratios to be commensural with the ratios of our experiment with the stone, we conclude by commensural induction, that the moon and the stone contain similian causal gregaria. In this manner Newton extended gravity to the moon, and it has since been extended to other heavenly bodies; and it is supposed, by induction per enumerationem simplicem, to exist throughout the universe.

CHAPTER IX.

THE DENOMINATE UNIT.

Those who have mastered the principles of books I and II, and of the previous chapters in this book, (which in the last four chapters we have endeavored to render more easy for the understanding by giving simple illustrations with sensuous objects) will be able now to proceed further with us in our still deeper inquiries into nature's processes. In our previous inquiries, except in similical and differential inductions, we have dealt mostly with aggregations, and have not given much of our attention to gregaria, from which only, those relations, which are called the laws of nature, can be evolved. And we have seen, heretofore, that homon per se makes no part of our knowledge, but that we gain our knowledge of homon by means of hetera; but our knowledge of similia and of differentia is not predicated upon hetera alone,

but upon similical and differential relations of gregaria; and if we can deal with these gregaria so as to discover the laws of causation by which they act, we will have to enter nature's mysteries in this regard by getting hold of relations existing inter gregaria. Now, nature is more accessible in some points than others, and her relations of quantities are most easily comprehended by us; we will, therefore, commence to evolve the laws of gregaria by investigating their quantitative relations. But for this purpose we need denominate numbers, which have an homonical standard of measure; and space is the only thing from which we can gain such denominate and homonical unit. We will, therefore, treat briefly of the denominate unit in this chapter.

If the hand of a clock, when it ticks once, passes from a to b (Fig. !.) in the small circle of the diagram, while a body on the larger circle passes from c to d, we may take the well known equation in natural philosophy \[ S = \frac{1}{2} \cdot T \]

\[ T \]

in which relations the space from a to b may be made the denominate and homonical unit of measure; and if this unit will apply twice to the space from c to d then 2
V_{ab} = 2.

The space from a to b may be made also the homonical unit of measure for a steelyard, a barometer, a thermometer, a steamguage, momentum, dry measure, liquid measure, money and throughout nature.

Tlfen let V stand for velocity, S for space, T for time, W for weight, and M for momentum, and take the following equations in natural philosophy:

1. $S = \frac{M}{W} T$.
2. $V = \frac{S}{T}$.
3. $M = \frac{W}{V}$.
4. $V = \frac{-S}{T}$.
5. $W = \frac{-M}{V}$.
6. $T = \frac{-V}{M}$.

Now if V in equations 1, 2 and 3 be equal to V in equations 4, 5 and 6 as it may be, and we take the value of V as given in equation 6 and put it for V in equations 1, 2 and 3; and we take the value of V as given in equation 1 and put it for V in equations 4, 5 and 6, we will have the following equations:

7. $8. 9. 10. 11. 12.$
Gravity, ia a body above the earth's surface, is nothing else than the
tendency of the aggregation to fall to the earth, and the quantum of space
occupied by incoinmensural aggregations inter se similical, "which is found
by multiplying together their lengths, breadths and thickness, is in propor-
tion to the quantum to this tendency to fall. If we take two pieces of lead
inter se similical, but occupying incommensural spaces, the piece occupying
the greater quantum of space at commensural distances from the earth's
center of gravity will possess a greater quantity of ijravity than the other.
Now by experiments it has been ascertained, that gravity above the earth's
surface, varies inversely as the square of the distance from the eartli's center,
or directly as the ratios obtained by dividing the square of the radius by the
square df the distance from the earth's center to the body .above the earth's
surface. And hence let G stand for gravity, r for radius, Q for quantity of
matter, and 8 for the distance of the body from the earth's center, and we will
have the following equations:
Qr2 S2G Qr2
G=z Q- S2=
82 r2 G
Now if 8 in equations 1, 2 and 3, be equal to 8 in equations 13, 14 and
15, as it may be, and we substitute the value of 8 as given in equation 2 for S
in equations 13,14 and 15, and the value of 8 as given in equation 15 into
equations 1, 2 and 3 we will have :
16. • 17e 18. ' .
Qr2 V2T2G Qr2
G Q = V2T2:r: ^
V2T2 r2 G

19. 20. 21.
\[ V = -\sqrt[3]{S} = RT \quad T = -\sqrt[3]{a} \]

Now what is called the specific gravity of bodies, i.e., the relation of gravities between a certain quantity of water or air, and a commensural quantity of differential substances as measured by space, varies directly as the ratio obtained by dividing the gravity of a certain substance by the gravity of a commensural quantity of water or air. Hence let \( Q \) stand for the commensural quantity of any substance, \( l \) for the gravity of a quantity of water equal to \( Q \), and \( G \) for the gravity of \( Q \) in any other substance than water and \( S \) for specific gravity, and we will have the following equation:

\[
S = \frac{G}{l}
\]

And if in equation 22 equili (I in 'jualion U>, and wc* aubsitulf^ we will li'.ive: Qr21

And in nil tli'» foregoing eqnnlions the standard of measure is a denominate and homonieal unit of space.

riiAPl^:ii X.

JIATIO.

U one of two numbers be made the numerator and the other denomi- .
liator of a common fraction, the ratio of the numerator to the denominator is such numV>er, that if you mnlripi^y the denominator* 1)y it you will have the numerator, and if you divide the numerator by i<. you will have the denomi- nator : ajid the ratio of tile denominator to the numerator is such number, that if you multiply the numerator by it you will have liie denominator, and if you divide the denominator by it you will have the num<"rat(u-; and as the ratio of two numbers generally appears in the form of a fraction, (which however, may sometimes be a whole number) when you have the ratio of the uutneialor to the denominator, if you invert the terms of the fraction, you will have the ratio of the denominator to the numerator, and vice versa. Now all persons, who have studied mathematics, will understand the following propositions:

\[
() a a 00 (X
\]

\[
aXorrO. - rrrO. = QC. - z.-0. = l. -^= o5. - ::=-0. QCX0=1. aud = = l.
\]

\[
a Q^ ^ ^
\]

In these propositions zero\(\) or 0, is To be understood as meaning an infinitesimal quantity, i.e., a quantity less than any assignable quantity and oo is its
reciprocal.

Now none of the foregoing propositions, excepting the last one, need any explanation for the mathematicians; the symbol however, needs some explanation as the mathematical treatises used in our schools and colleges have not given it its true significance, which we will now proceed to explain. Take the proposition

\[ a^2 - b^2 = (a-b)(a+b) \]

If in this equation we make \( a-b \), we will have

\[ (a-b)(a^2+ab+b^2) \]

But in equation 1 the numerator is a multiple of \( a - b \), and it may be put into the form of \((a-b)(a^2-ab-fb^2)\); and the denominator is also a multiple of \((a - b)\), and it may be put into the form of \((a-f-b)(a-f-b)\), and then we will have

\[ \frac{(a-b)(a^2+ab+b^2)}{(a-b)(a+b)} \]

Now from this equation we may have

\[ (a-b)(a+b) \]

4. \( x = \frac{a+b}{a+b} \)

Or we may have

\[ (a^2-ab+b^2)(a^2-ab+b^2) 3a^2 3a \]

How are those incommensurable results to be explained? Now as

\[ \frac{1}{1} = 1, \]

1 is the ratio of the numerator to the (denominator and also of the denominator to the numerator, as it always is when the numerator and denominator are absolute!)^ commensura; thus 4 8
And it is evident that in equation 4 we have taken the fraction
\[ \frac{a^2 + ab + b^2}{a + b} \]
and multiplied its numerator and denominator by the common infinitesimal quantity \( a \)
while in equation 5 we have multiplied the same fraction by the ratio of \( \frac{a}{a} \) to \( \frac{00}{00} \).

i. e., by the ratio of commensural quantities. Now it is evident that when
the numerator and denominator of a fraction are commensura, their ratio
will be the denominante unit^ and it is also evident that, in all proper fractious
the ratio of the numerator to the denominator will be less than the denomina-
ute unit: it is also evident that the difference between \( J^4 \) and \( J^4 \) will be a
greater quantity with reference to the denominate unit, than the difference
between \( J^4 \) and \( J^4 \), while their ratios are commensura: thus \( J^4 \) and \( J^4 \) will be
\( \frac{y8}{y8} = H \) and \( J^4 \); but \( J^4 \); \( = K \) and \( M - H^\wedge V s \) and \( U > \%. \) And the
greater the decrease of the numerator and denominator, while their ratios
remain commensura, the less will be their difference in numerical value com-
pared with the denominate unit; and hence the difference between the
numerator and denominator may become infinitesimal and the ratio all the
time remain the same, i. e., 0 - 0 < 0, while 0^0 = 1, results, which can only be
true of infinitesimal quantities in their relations to our minds. And if by
we mean absolutely nothing at all, 0 - 0 is nothing, 0 - 0 is nothing and 0X0
is nothing; and if by oo we mean Something without limit, ooX oo is not
within our conceptions, nor is oo^ oo. But although we can not conceive of
absolute existences, and of course can not deal with them intelligently, yet
we can conceive of finite relations as being absolutely commensural and in-
sommensural and hence if we have equation 4 or 5 as above, we may con-

ceive of the relations of \( a - b \) in the numerator and in the denominator as
absolutely commensural, and of \( a \) and \( b \) as absolutely commensural, and then
the relations contained in \( a - b \)

\( a - b \)

will destroy each other and this fraction will have no relation to offer towards
the other factor, i. e., its relations will be a nonentity and it need not be con-
sidered, but if \( a - b \) in the denominator be an infinitesimal quantity and \( a - b \)
in the numerator be an absolutely commensural infinitesimal quantity,
will absolutely equal 1, the denominate unit; and we have seen in the previous chapter, that the denominate unit is the space which is the homononal
standard for the measurement of time. Now whenever any number is multiplied by 1 the number is taken one time, i. e., its value is not affected; and whenever a number is multiplied by absolutely nothing, i. e., not touched at all, its value is not affected; and hence any number multiplied by absolutely nothing will remain in the same relations, as when ii is multiplied by the ratio of two numbers, whose difference is absolutely nothing; and therefore in equation 4 we multiplied both numerator and denominator by an infinitesimal quantity, which produced products whose difference was not absolutely nothing though taken to be so, while in equation 5 we multiplied by the ratio of two numbers, whose difference was absolutely nothing, and hence the incommensurable results. And upon the supposition with which we started, i. e., that a was absolutely equal to b, equation 6 contains the true result.

Now from the foregoing discussion it will appear that, the symbol

\(^\text{^5}\)

may be made to make its appearance in every ratio by factoring and supposing the difference between the numerator and denominator of one of

Q the factors to be less than any assignable quantity: thus the ratio of 4 is \(^3\), which may be equal to \(a-b\)

when the difference between a and b is less than any assignable quantity and we multiply by their ratio; but if we multiply by the quantities themselves we will have

\(^4\)

i.e., we will have 1 instead of \(^i\). To illustrate by figures let \(j^-= \Xi4\)

\(4\)

and if \(4=4\) absolutely and we multiply by their ratio we will have \(^3=1\) \(Xj'\)

\(\Xi\), or if we multiply in, we will have \(4X14\)

\(K= - - H'\)

\(4X38\)

but if 4 and 4 be reduced to infinitesimally small quantities and we multiply in we will have ' .

or if 4 and 4 be made enormously large quantities we will have \(q^\)

\(^\text{^5}\)

And hence the symbol — Digitized by vj00g1C

33

is the ratio of infinitesimis, and \(ff\)

\(Q0\) is its reciprocal; and the ratio of these ratios is 1; thus

\(- ^--=1\) and \(- H- =1,\)

\(0000\)
i. e., the ratio of ratios, which are reciprocal, is always the denominate unit; and hence the true significance of $q^\frac{1}{2}$ is ratio of reciprocal ratios.

If we take the equation $a^2 = b^2$ and make $a=b$ infinitesimally we will have $x = \frac{1}{2a}$; but by factoring and canceling, we will have

$$
\frac{a+b}{a-b} = \frac{a+b}{a-b}
$$

Now if by we mean absolutely nothing then $x=2a$, and

$$
\frac{1}{2a} = \frac{3a}{2a}
$$

If by we mean an infinitesimal quantity then $x=\infty$ and $-=-$, i. e., $-=-$, will be the true ratio of $x$ to 1; and if by we mean an infinitesimal then $x=\infty$ and $-=-$, i. e., $-=-$, will be the true ratio of $x$ to 1; but the two values of $x$ are incommensurable, i. e., in the first case it is finite and in the second it is infinite: and we will have the proposition

9. $X:1::\infty:1$, $xX=\infty^2+1=-=\infty$, A^aain take the equation

$$
(a-b)^2
$$

10. $3e^x = a^3-b^3$ and by making $a=b$ infinitesimally we will have

$$
\frac{a+b}{a-b} = \frac{a+b}{a-b}
$$

11. $x=\infty$, this last equation may be stated thus $-=-$, i. e., $-=-$, will be the true ratio of 1 to $x$; but the two values of $x$ are incommensurable, i. e., in the first case it is finite and in the second it is infinitesimal: and we will have

$$
X:1::1::0:1
$$

And from the above we see
that — , or — , or — , or — , may be a ratio and may have a ratio. And we

1 0. 1 . 0^  

a 'oo 00  

may have — «= — ^and— ==— ; and hence — or — may be a ratio and niny

0^)'^ ^  

have a ratio, and they and their ratios are the reciprocals of each other.

Now the whole object of differential calculus is to determine the ratio of rates, i.e., to determine the ratio of ratios; for rate and ratio, when to motion or increase, are the same thing. And the ratio of (me con-^^"^  

I  

34  

number to another is easily found by the ordinary principles of Arithmetic; it is easy also to find the ratio of rates of the movements of two bodies, when their rates are uniform, i.e., when each one for itself makes commensural spaces in commensural times; but when the rate of one is uniform and the rate of the other proceeds upon some law other than that of uniformity, i.e., when it does not make commensural spaces in commensural times, a case is presented for the differential calculus. Let us then examine the following Theorem in the calculus: —The rate of variation of the side of a square is to that of its area, in the ratio of unity to twice the side of the square." This is the enunciation of the Theorem as given by Prof. Loom is; as we consider, however, that this enunciation is incorrect and does not set out clearly the matter to be proven, we will give the following in its stead: The rate of variation of the side of a square is to the rate of variation of the corresponding area, in the ratio of unity to twice the side of the unvaried square —|- the variation of the side. Let a.b. (Fig. 1.) be e Figure 1. f the side of the square a, b, c, d and a, and suppose

I l this side to be elongated to e in one second of time,

i be will then be its increase and the corresponding j increase of area will be the space b, e, f, g, d, c, b:

, ^ let h=b e, and g=1)efgcd, (hen h=increase of the' ; sid( , and g=the corresponding increase of area.

Now ash=the increase of the side in one second, the rate of this increase will

a d g 1

and as g = the corresponding increase of area, its rate of increase will
be\(=\) \(-\); and the ratio of these rates will be \(=\) \(-\).

Kow let \(x = ab\) the side of the square \(ab\text{cda}\), and \(y = ae\) the side of the square \(aefga\); then \(y-x = h\), and \(y^2-x^2 = g\), and consequently,

\[
\begin{align*}
    h &= y-x, \\
    g &= y^2-x^2.
\end{align*}
\]

But \(v + x^2 = h\), and therefore:

\[
\frac{h}{1} = \frac{g}{2x}. \quad \text{Digitized by Google}
\]

Note. To treat specially of mathematics is not our object in this Work, nor do we wish by criticising to offer refutations: but as the understanding of ratio is important and as the calculus treats specially of this subject, to set it upon clear and true foundations must be acceptable to every student. And from the above demonstration it will appear to every reader, that the ideas entertained by many teachers of the calculus, that \(h^i\) is not the true ratio of the rate of increase of the side of a square to the rate of increase of the corresponding area, but that in order to rect at the true ratio we must reduce \(h\) and \(g\) to infinitesimal quantities, so that their difference may be less than any assignable quantity, supposing that thereby the ratio will be the true ratio to within less than any assignable quantity, is erroneous.

Again, take the Theorem: The rate of variation of the edge of a cube is to the rate of variation of the corresponding solidity, in the ratio of unity to the square of the varied edge \(-\) the product of the varied and unvaried edges \(-\) the square of the unvaried edge. Let \(h\) = the variation of edge, and \(g\) = corresponding variation of solidity; and let \(y = \) edge of varied cube, and \(x = \) edge of unvaried cube; then

\[
h \cdot (y-x) = 1
\]
If within this equation \( y = x \) to within less than any assignable dif't'ereence, 
\( h \) and \( g \) will become infinitesimals and we will have 

\[
\frac{1}{3x^2}
\]

and hence for infinitesimal variations, \( h : g : 1 : 3x^2 \). Tf the edge be decreas-
ing instead of increasing \( x > y \) and we will have 

\[
\frac{1}{x^3 - y^3} - \frac{1}{g} \frac{1}{3x^2}
\]

When the motion or variation of one body or thing is unif,
rm and another body or thing makes commensural increments of increase or decrease 
of variation in consecutive commensural times, the latter bod)' or thing 
varies in Arithmetical progression; and in order to get the ratio of the 
ratios of the variations we must divide the ratio of space made by the first 
object in a given time by the ratio of the space made by the second object in 
a commensural time. Let \( h = \) space made in five minutes by an object 
making uniformh'\(^b\) b feet per minute, and let another object move, making a 
feet for the first minute a+b for the second, a+2d for the third and so on for 
Ave minutes with the commensural increment of increase of d in each suc-
cessive minute:

\[
\frac{h}{5S}
\]

then \( = \) ratio of the first objects variation, and letting \( S \) stand for the sum 

5 S 

of the terms in the second objects variation, \( = \) ratio of second object's 
h 5 

variation and \( = \) ratio of these ratios. But letting \( n = \) number of ter\(\text{w}^i\)

S • Digitizecfb\(^H=il0pQie

and \( l = \) last terra, and \( h \) will be equal to \( bn \), and \( 8= l | \ | n \), and her^ce:

I 2 J

11 bn 21)

15. \( = \) - . But \( l = a + (n-1)d \), and hence;

S fa+l l a+l

I In
h 2b

If . — r= , and when n— 1

17. — -- , and if we reduce h and S to infinitesimal, S 2a+(n-l)d
   b b

18. = 1, therefore, is the Irue ratio of the objects' variations a a
   jrt the infinitesimal point from which the)* begin to vary,
   a a

The equation — = irives tlie ratio of tlie first term in an Arih-
   1 a+(n-l)d "
   metrical progressioii to the last term considered. If the reader does no
   lull}- comprehend this and the following paragraphs, let him turn to some
   mathematical work upon the subj.;is.

If one object vary uniformly and another object vary in such manner
   that the successive values made in commensural times are" in proportion to
   each other, i. e., the terms have a constant ratio, the latter object's variations
   are in Geometrical progression; and we find the ratio of these objects' vari-
   ations by dividing the ratio of the one by the ratio of the other. Using the;
   letters as in the preceding paragraph with the addition of r for the constant
   ratio, and relying upon the readers knowledge of matheijatics we will have:
   h bn bn(r— 1)

20. — rr = . But when n=1 we will have
   S arn— a a(r" — 1)
   r-l
   h b b

21. = — , and consequently — will be the true ratio of these
   S a a
   objects' variations at the zero point of varying. The equation a a

22. — = gives the ratio of the first term to the last term considered.
   1 arn— 1
   If .in object varp in Arithmetical progression and another by Geo-
   metrical progression and we use capital letters in the Geometrical equation
   for the sum and first term we will have
   . fa-fil

I I "

s t 2 J [r(a+1)-(a+b)]n

28. — ^ rr ^ J
We have gone far enough, perhaps, upon the subject of ratio.

CHAPTER Xr.

TRANSFORMATION OF PROPOSITIONS.

If we take the three distinct propositions:

\[
\begin{align*}
    & A A A V \\
    & T S T S \\
    & a < b
\end{align*}
\]

by uniting them into one we may have

\[
\begin{align*}
    & A V A V A V \\
    & T S 1' S T 8 \\
    & a < b
\end{align*}
\]

And if in proposition 2. we place the sign \ or V by the side of the term?, not as signs of liomon or helera, but simply as the sign of incommensura we will have

\[
\begin{align*}
    ^1 \ ^8 \ _1 \\
\end{align*}
\]

If we take the distinct propositions

\[
\begin{align*}
    & A A A V A A A V A A A V A A A V / , \ \\
    & T S T 8 T S , T 8 T 8 T 8 T 8 T 8 T 8 T 8 \\
    & 4 . , ,, \\
    & a < b b=c a = c l
\end{align*}
\]

by uniting them into one we may have

\[
\begin{align*}
    & A V A V \\
    & T 8 A V . T 8 \\
    & 5. T 8 .
\end{align*}
\]

\[
\begin{align*}
    & A J M = < b | V \\
    & | c d |
\end{align*}
\]
And fnmi proposition 5 by writing the sign of incommensura under the
terms we may have the propositions

\[ a V a V a V a V a V Av \]
\[ T8 AV TS TS AV TS TS TS TS \]
6. TS . 7. TS . '8. .
\[ a+c = < b+d aXc = < bxd \]

< > < >

If we take the commensural propositions

\[ a = < b I V \]
\[ c d \]

mA \[ \wedge A'^{^L'} \wedge , AA A A , AA \]
\[ TS A V T8 T8 AV T8 TS a^{^T1''} \]
9. TS , TS

\[ a - b C = (J Digitized \]

by\[ ^\wedge OC^\wedge C \]

by using the sign of commensura (not that of similia) by the side of. the
terms we may have

\[ A V A V AV \]

10.

T8

1^ 8 T 8
- , from which we may have

d

11.

A V
TS

\[ a+c = b+d \]

12.

AV
TS

axe =:

AV
T8

bXd
and 13.

If we have any number of incommensural propositions as the follow-

14. $a < b$

we may derive from them
15.

16.

a+d

A < a+d

<

b

A V

TS

ixd

<

TS

A<

H

av
And if we have any number of incommensural propositions as the following:

^A

we may derive from them
19.

\[ a+b+c+d+e+f \]

\[ < < < S \]
By setting down all the signs in our transformations, we are able to integrate or resolve the complex propositions into their simple and primitive ones without any difficulty; but there is still another object of more importance in doing so, as we will see hereafter.

Now we have shown heretofore, that both incommensural and commensural propositions contain only relations inter se similia, and as, we have used the letters a, b, c, etc., not to distinguish kinds of things, but merely distinguish the quantities of similia, proposition 6 may be transformed in

\[ a + c \sim b + d \]

And from commensural or incommensural, or commensural incommensural, or incommensural commensural proposition may be transformed by striking out the signs of equality and inequality between the terms and inserting in their stead the sign of similia.

Now let the letters a, b, c, etc., stand for names, which distinguish similia and differentia and take the differential propositions

\[ a \sim b \]
and by uniting them we will have

22.

a

c
d
AV
TS
H-H-

AV
TS

b
d

Take the propositions

aA Av AV
T S T S T S

4^8

4

AA
TS
24.

By uniting we will have

or, 25.
As the letters a, b, c, etc., are distinguishing names we need not place sign by the side of the terms, as we can integrate without doing so.

Take the propositions

\[
Aa \quad AV \quad Ay \\
AA \quad AV \quad AA \\
TS \quad TS \quad TS \quad TS \quad TS \quad TS
\]

26. — —. By uniting them we have

\[
a \quad II \quad a' \quad a'' \quad II \quad a''
\]

any

27.

\[
A \quad V \\
TS
\]

\[
A \quad V \\
TS
\]

\[
AV \\
TS
\]

\[
a'
\]

Now we havd heretofore shown that the mind's capacity to heterate depends upon time and space; and it may, perhaps, be well enough to make a single remark further on that subject here. If a .bell be struck, "we can both see the bell and hear its sound in an homonical time, while the bell occupies an homonical space: but the organs of vision and those of hearing occupy heierical spaces; and the sotfn and the light coming fnira the bell do not come to the mind through homonical spaces, i. c, although there be
apparently in the case homonical time and spaces yet the spaces are really hetera, and they enable the mind to heterate. Take the heterical propositions

\[
A \ A \ A \ V \ A \ A
\]

\[
T8 \ T8 \ TS
\]

38.

\[
a \ V \ a'
\]

\[
b
\]

\[
A
\]

\[
b^*
\]

By uniting them we will have

29.

\[
M
\]

\[
^1
\]

\[
^8
\]

\[
^8
\]

\[
a
\]

\[
b
\]

\[
v
\]

\[
a'
\]

\[
b'
\]

But if we should transpose the terms of the first of propositions 28 and then unite it with itself we would have
Take the propositions

...
Vs
n
^%

a
aV
a

b b

But if we unite the first of the propositions 31 with itself we will have
H ^% n
88.

a AA a
a a

Now from the few examples given above any one with moderate
capacity can see how to unite and transform simple propositions into com-
plex ones and obtain all the varieties of propositions having the varieties of
signs between the terms as set down in Chapter First ot this book and to
place the appropriate signs over the T's and S's, we need not therefore deal
further with this matter.

Now we have seen in Book I, that in every case of causation some
homon is converted into hetcra or vice versa; some similiae are converted into
differentia or vice versa; or, some commensura are converted into incom-
comensura or vice versa; and if we compare the simple propositions with
the complex ones derived from them in the proceeding transformations, on
comparison of the signs of the 8's over the terms we will see, that in the
transformations given the heteration of space has occurred. In those trans-
formations of propositions, however, the heteration of space may have been
made merely by the mind; but if we suppose a, b, c, etc., to be material

«1

objects and to have changed the relations in which they existed as expressed
in the simple propositions, into the relations as expressed in the derivative
propositions, then causes external to the mind bringing about these changes
have involved the heteration of space. In the transformation of simple ho-
monical propositions into homonical homonical propositions, indeed, no
such change in the signs of the S's is indicated nor could the heteration of space occur, were a, for instance, a material object and contemplated in its different mental relations.

But in Book II we saw that among causes a homon of time and a homon of space are the necessary conditions of causation, and also that effects sprig from heterical causes. Let us suppose, therefore, a, b, c, etc., in the foregoing complex propositions to be causes, and let us make a homon of time and a homon of space over the terms and see what changes follow. If in proposition 6, we change V into y\ over the S's on the terms, we can not write the new proposition resulting without performing the addition; but letting V stand for the sum, we may then write the new proposition and have

\[ A A A V ^ {\wedge} A \]
\[ 'r 8 T s r 8 \]

u.

\[ V = \]

We may deal with propositions 7 and b in a similar manner.

II we change V into A over the terms of proposition 11 and let v stand for the sum, we will have

\[ A A A V ^ {\wedge} A \]
\[ 'r 8 T s r 8 \]

And if in this proposition we change V into \ between the terms we will have

36.

\[ V A V \]

From which changes we see, that the homonating of the spaces between the objects in the terms produces effects inter se heter. but each of which per se is a homon; and the homonating of the spaces between the terms produces an effect per se homon : the converse is also true.

If in proposition 22 we change V into A over the terms two effects must be produced; and as ac and 1)d are differential differentia the effects inter se must be differentia. Let x stand for one of the effects and y for the other, and we will have

\[ n \]
And if we change V into A between the terms we will have all effect differing from both x and y, i.e., we will have

«1

Let us now take propositions 23 and go through all the transformations, which the reader will now readily understand

H
Produce by heterating space between objects in terms towards each other.

By homonating space between objects in terms.

By homonating space between terms.

By heterating space between terms.

By heterating space between objects of terms.
By heterating' space between objects of terms from each other.

We have now gone far enough upon the subject of Transformations of Propositions to give the reader a thorough understanding of the matter, if he will study and use his own mind in working out upon a slate the various Transformations possible, in order to familiarize the modes of reasoning.

CONCLUDING REMARKS.
It was the intention of the author to have continued this book much further than its present limits, to treat of the ratio of gregaria and of their
combinations in propositions by which what are called the laws of nature can be evolved, to point out errors in the fundamental principles in natural philosophy, to state experiments made and demonstrable results actually obtained in light, electricity and heat. But hard times, ill health, and the great difficulty in getting the authors ideas in print at all, so as to place them before the scientific world, have compelled the him to stop here: although the subject is abruptly broken off and much to his regret the applicability of the science to the investigation of nature is not exhibited, the author claims that he has made many valuable discoveries in physical science which must be left for another work and for more auspicious circumstances, if such should ever come. The present edition has been put in print under the most harassing circumstances and difficulties, and it cannot be expected to be otherwise than that numerous errors and obscurities should appear in it. These the reader will excuse, and when scientific men shall have investigated the work and expressed their opinion about it the author will be better prepared to judge of the expediency of making the attempt to complete a work on natural philosophy based upon the principles of experiment and reasoning exhibited in this book.

THIE END.