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OUGANON OF SCIENCE.

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PREFACE-

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In offering a new system of philosophy to the scientific world, the author is aware that maju^ w^l] aav of it at the ontsef as Omer Pasha did of the Alexandrian Library, "If it contain thp Koran, we have it already, and whatever else it may cwntain 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 »ur opinions, which are supported by the names of distinguished philosophers; yet our condition, perhaps, may be no niore happy than that of Pollock's rustic, who was confirmed in the belief that the vipun] line ^vlnrh i',irt liim round nbout was the world's extreme. Fortunatel3j 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 knowledg'^ 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 tliat, in the author's ©pinion, a thorough perusal will repay the reader.

The thouglits contained in this hook hnvo hoen grained by much labor, and have not been set down without much refiection. The subject is a pro- found 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 fn.ely respecting its merits. For we believe, tliat the philosophic seeker for truth, of the present and future ages, will find in it suffioioiii immutable and valuable truth to approve and justify the time and labor spent by the author in his attempt to correct erro' and to open the gates of scientific truth to mankind. The Authok.

EtJREKA, California, Januj-.ry 2."). 1879.

IXTROBVCTIOJ^.

" Philosophy and the intellectual sciences like statues/' sa3's Bacon, *'are adorned, and celebrated, but are not made to adrance; nay, they are frequently vigorous in the hands of their author, and thenceforward degenerate.*' Tliis remark of Bacon's is iitterally true of Loeic; which word will piobably suggest to the reader tliat class of' studies at the present time more nearly related than any otlier to the subject-matter of titis book. And in attempting to explain something new and unknown to tlie reader, we are ft'cquently obliged to make ourselves understood by reference to something already known. In our introduction of the reader to the expknat ions and substance of the science which we have endeavored to exhibit in the subsequent oages, therefore, we would ask and expect that he has some knowledge of the standard works up<m logic, among which that of Archbishc p Whately is as able a specimen ot the received systemi as any; and as it is condense and oontainn but little irrelevent matter, it is therefore to l)e preferred to any other. We da not, Ikowever, insist that the following pages can not be understood without such previous acquaintance with the works of others. We have endeavored to make this treatise as elementaxy as possible; so that it may i c in itself sufficient to convince and instruct the reader in its various doctrines- Yet such previous acquaintahct with the i)opular 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 positifely 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 l)e<ause that science has not in the succeeding ages from Aristotle, its author, unraveled itself into greater number of details, or varied its elementary principles. True principles are immutable,and to depart from them is to fall into error. But the popular systems of logic, in our estimatiim, possess no value except in disputations; they are in fact what Archbishop Whately says of logic in general, * E. tirely conversant about hmguage." That the popular systems of logic make the aaalj'sis, 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 |>erson in his search after truth. In driving men by their own words to admit what they already know to lie true, i. e., in ar^imentHtion, they may l>e of value; but in making inferences from tri""'

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 centuries, 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 t^cienc^s must have been made without reasoning at all, or else the method of reasoning is not such as it has beca stated and explained by these authors.

But jalthough 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 oflf-shoot from logic; inour estimation all that is valuable in the popular systej^s 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 t^ke 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 gtt 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 w »rd8, 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 wordacan 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 b> its pi'ocesses fiirins 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 stntcd by Whately, "It relates entiiely to the words of a proposition."

To make a scientific analysis and explain the processes of the mind in reasoning require a difterent treatment and mode of investigation from that hitherto pursued by writers upon bgic. And we may in truth say that in the

pages of this book, we have pursued a method, in the greater part, unattempted heretofore. And certainly the exigencies ot the world demand a better philosophy of reasoning than writers heretofore have given. If we l6ok about ns in onr own country, or travel abroad and observe the various ^pinions concerning the most common affairs and eifects, and notice the zeal with which men pursue the most absuM theories, we will conclude with the great English philosopher, that "the specious meditations, speculations and theories of mankind, are but a kind of insanity, only there is no one to stand by and observe it." Il is true Uiat madmen may agree pretty well on many points, and the grave digger in the play thought that Hamlet*s madness would not be noticed in England among a people as mad as himself. And notwithstanding the advancement which has been made in the arts, and many of the sciences during the present century, men vet are driven about in their opinitms as though there was no certain truth to be obtained, or else they pursue some absurdity as though error and truth both were in effect the same thing, ^d from these sources of trouble, which set men to travel the wrong road to happiness and true progress, there is no escape for mankind except in the further development of the sciences. But in the words of Bacon, "The pres-

eot systems of logic are useless for the discovery of the sciences," and "they rather assist in confirming and rendering inveterate the errors founded on vulgar notions than in searching after truth."

"The' unassisted hand," however, "and the understanding left to itself posftsses 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 cerUin object, or tell the hight 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 »btained; by what m«ans could such conclusions be reached. And every one knows that the science of mathe- matics 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 ind 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 cerlainly 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 Hia progress, which is made in them, seems to proceed in most iustancei_^

THther by cJiance llian b}* any direction which philosophers have sWen. The school-boy at the present day studies his logtC; but tiie man who goes forth In the search of truth, throws it away expecting no lielp from it. Those mon, who have advanced science the most, have paid but little regard t«i those philosophers who have treated of the science of reasoning; while those w lio have looked and relied upon help and direction from such philosophers, have produced nothing of importance. No person, who has made discoveries in science, will, upon reviewing his experience, acknowledge either that his mind had been led to use habitually the mode of reasoning always to be adopted, or that this mode was »ugg<'st*d to him in given cases by his previous - studies^ of the tlieoretrical systems of reasoning used in the schools. Most persons, indeed, who have advanced science, have .been so intent uprm their conclusions that, they have not coi sidered the processes of their mind« used in gaining those conclusions to be worthy of consideration.

But if the true processes of reasoning were understood, reasoners wou-ld cnlainly l>c guided to advantage by such knowledge, and they would use tliis knowledge as an instrument to assist their understanding in solving proT^ lenis in particular sciences. To assert that there is a science of reasoning and yel 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 prr)- coed 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 arc in pursuit of any truth, which can be gained by reasoning, what method we must pur- sue 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

ti'^cording to all the authors upon logic, when we lay down our major pi emise we virtually assert the conclusion ;\4nd hence we must virtually gain the knowledge ot the desired truth oefore 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 exj ect to lay sure foundations upon which evei*y Hfiience can be built in all their beauli<*8 of symetry, we must hwk after/ a])elter understanding of the reasoning processes than writers upon logic have been able to exhib i hitheito. This we will attempt to do in this book. And we are aware that tlui task is not only in itself a veiT dilficult one, bv.t that ihe prejudices of scholars are against us. Bactm's attempt to introdu e the inductive system of philosophy has cleared away In some measure the preju- dices of nv.iny in ^ixvov of the Aristotele in m^itho l^j. But Bacon did not per- fecl the inductive system, and allhougli he bus lefi h^ve and there very.
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VartfeliJe^Sflife birlhr Aftfef pfbcesstes of'HheUind, yet h6 dldiobf ^yst^to&rtze

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besides the difficulties of the suHjectj'liiive io liVfii^coiiie p*'eJu&iCM itfil^eir
study of this book. A careful study we believe, however, will conquer thos3 prejudices.

Before proceeding to the details of a treatise it is usyal 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 bo 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 defini- tion to put a band around the inquirers thoughts in the beginning. If a de^nition convey wrong impressions, it must fetter the mind in its contempla- tions ; and to lead a reader who has not yet studied the science, by a defini- tion to understand the whole drift of the matter would require a fuH exposi- tion of the definition, i. e. a full treatise upon the definition. We may say, however, that the present treatise is a scientific«iWork, 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 Aristottle*s Organon ; but because in it we propose to show the instrument or instruments by which science^ are constructed. Bacon called his w#rk the "Novum Organ um,'^ and since his time several works bearing that name have appeared, all of which, so far as we know,, follow Aristottle 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 sQience. always have been made, and always must be made^ it made at all. Kor 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 tha world a more prosperous era Ut science than it haa had hitherto. ' And therefore we have the boldness to call upon scientific men and upon all meu, who wish for the prosperity and adyancement of the human race, to gire their serious attention toit, so that intelligence may work out order and happiness in our civilization. '

book: I.

CHAPTER I.
•^ Highest Generalization and Fibst Division.

lor other less extensive generalizations, and soon perceives vertebrata, articulata, 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 upderstanding of the process employed in acquiring knowledge by reaaon 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 6f 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 JJeqts^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 in^infng, but a posltive'riamefbfinj^'kntfererything exfsepti^ng tl^^ egp, or UAind itself. The German metaphsicians distingi^ish the ^infjj ^^sejf by *'i)ap Ich," and the French by/'Le moi'*; and. Sir Wn^. Hapii^fboa h,aa bro^u|;h,t the ego and non-ego into vogue in the English nom-r .e^clja^tur^. Most per^ops will know that ego. is the Latin personi^l pronoun corrciipoiidiii^ tu our persopal proppun I of the first person; ego is More cou^-veaicBt to be used us a noun than our pronoun I, a single letttr of the alphabet^ QDd Lhercfore it is used. And we 'consider these contradistinguishipg term;3 to be apt and useful j fur, between the ego and the non-»eg;o, we are to look, for the relations tmd n aults i a question. But yet, how shall we classify the objects of our cognitions in a mannjBr which will evolve and clearly set before us these lilations and their r»sults. We cannot clearly set before us these relatiotfs by a classification of the various ol)jectsc0naj)reiiendjBd in the npn-ego, according to some pecuViarUics existing, inter /ae, for this does npt in a su&ciently apparent manner, iuvolve the o^p: and upleps both the ego and non-«go be,i4vqlved there can be nu relations existing between theni, and no resultsjpaa be p;'odu.ced. Vhe classilici^tion necessary, as a basis of re^oning, must, doubtless,^ start with the highest generalizatioD^ for to plunge *in medias res,* and classify ccrtaia objects, as plaatigiaLk', and others as degitigrade, only points out the compjirative anatomy and relations of these objects inter se; and to classify the faculties of the mind iato memory, will, imagination, efc„ only brings out the relations exisiinj^ between these fficulties. The mind itself, or ego, is not involved 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.

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^ Now t^eJ^}i/E{^l; gi^iwrs^j^^tipi^ rtha^? wrv«Uld can mak^ of both the ^Jftu^"ij9^-ef9J^

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ego, but all other minds in reference to my oiiiid ibeloiig'to the jMH^jl;^ j^for ij|prx jjtf W?^ 'mwi ^^e >l|isjowii. Wildisetopej Ike $«fait '^om'^^idtf and to 9|piif^^39E^)^(jnf^lt&U il^Mii^ But again W«

,14

^ these thiogfrare inoo^ego; my mind itself only for me and yt>ur mind only for you are the ego ; all other things belong to the non-ego.

2^0 w for farther classifications, "We have to deal only "with thenon ego : ■for the ego being a single existence is incapable ot divisibn and subclassifi— , cation; but the non-ego is capable of division ad infinitum, and therefore, we may n ake numerous subclassifications of it. The aon-ego, however, mui^jlways be subclassifted with reference to the ego and not merely witli

• reference to the constituents of the non-^go inter se. The ego and non-ego merge in existence and this must be borne in mind; for, whatever Mlations,

. if iuiy^may e^ist between the eartH and the moon, they never could be any- thing^ us uuless each of these objects sustain some relatioh or relations to the ego, my mind for me and yoijr mind for you. That Which bears no re- lation to the ego can not be the subject of our cognitions and it must be toils as though it had do existence; U is only by means of the relations of objecta to otlr minds that we can gala ^ny knowledge of the relation^ existing be- tween, the objects themselves^ In our classifications, therefore, it is impor ■

; taut to keep in v^ew and take the ego, my mind for me and your mind fbr

you, as the point from which to run to every object of the noQ-'-ego.

* CHAPTEI} II.

Facts and Truths. «

. Having ia the previous chapter divided existences into two classes in such manuei* that the relationi IJetween them will always involve the mind , as one (^ the ^things related, we come now to the daseification of the .non- . ego witb reference to the ego. And a very obvious division of the non-ego . with reH^rence to the eg<^ w«uld be into existences of the pas^ of the present and ot the future. Most of us, no^^douU, have had fViepds whose ph3 sicat , forays have passed away; their fbrms were existendls ft the past, but in the preaent.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%attls each oth^r 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 t|ie present point, and those existences of the non-ego oecnpying the same and different points. But all the existences compreliend^d in the non-ego may be thrown into another ^aasification, which shall involve the relations existing between the^go and non-ego in other respects l^an tha(of time and of that as welL

, 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 thift ditision, it is necessary to consider the relations of the

ego merely.as an existence among other exiBtencea. That which has had a beginning) must have been brought isto 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 b^ '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 4epii!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 affiMted 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 iaflected 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 haye no cognittons ef the existence of a tree, and it would be to; the mind as though it were not. The mind hadabegmning and therefore it is a dependent existence; and an existence, whose coming to be an ezistence is dependent, must ab Initio' be passiye: and its activity and pasivity both, must hare been either giren to it aimnltaneously, or the former must have been developed (torn the later. For, the acting power of a dependent existence can not exist of itself indefpendent of other things, but anotlier or othec' existences are presupposed to- generate

it And if the ego be dependent, its dependence must be up^n the external ' non-Tego, otherwise it would be independent; and dependence implies the reception of action. The dependent mind, therefore, is dependent for its ezLitence upon the action of that part of the non-ego, from which its existence came, and for its knowledge uppn the action ot that part of the external n«h-ego, ef whoscTexlstence it gains knowledge.

Now at the first with respect to knowledge, other e^^istencesjact npon the mi(»d without its inherent energy being exerted. That we are boin without an/lLUowledge, 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 cons6iousnes8: for to be conscious at all, it must be cojpi^cious of something: to be conscious of nothing is to be without consciousness: if coqsciotlsness can l>e contained mmerc pasivity then a rock can be conscious. Bot activity is necesssary to consciousness: and mental activity must be deve^ped from the mind's passivity by the action of that part of the non-e

upon which the mind's dependence in this respect consists. For the|]uower to re-

• celve an action must be contemporaneous With the mind's, existence: but the mind must exist in Uife world before it Can be acte^ upon by.any'power^otlier than tliat which created its being before it '^''is realTy> mind,' When, thip^efore,
the ego first comes into the relations of u?.tpdrt of the'non-e^o, h-'om wbicli Its existence was not derived, it must first \)e a<ited upon aid act ii^ response "before It can be conscious of that part df the non-ego.' ^knd wheji w^ r efiect that tWfeext^rnial non-ego affects the mind only through the sen se^s, and. that in the foetal state, a^ these senses, even that of touch in a^grea^ measure at least, are secufea a'gainst external * impre^ions, we can not dpub\ ihatihe mind at flr^t is unconscious of an external world./ Ahd the only other t^ii^gs ©r which it cot^Jd be conscibusj ar^ th6 actipn or actions of the pow^r .T^ii,{oh caused it to «xi«t, abd of its own existence. \^6w the action o^ thatjCxi^t^nce or of those existences which created tive'injnd. must stilt continue to be eX€rted,*or the ego- becomes either an independent existence or a^ i^on-§ntity.

• Bat we tiavc shown thfe mind to be dependent, if if had a lie^inninff': a;id -therefore we may' with matured faculties appeaj to our conspiaqsnes? i-e§pect-

ing the action of that creating power, and all persons will say th^t they Vre 'emtire¥yunc6Q8ciousbf the action of that power which prolongs our exf^tfence. ' It k, however, c'omtnc^tifly said that we are conscious of our Owi^ e^is^nce,

i. e.', that the ego is conscious t)f itself per ^e; T)ut we regard|ihl^ a^ ap errpr.

• Ffer Hfiie^s the mind act, it dan not be conscious at all: and when it dbp8,i^.t, 'H is consWoiis ot Its acts, stAtesand feelings; but or itself pei's^ it iXftp.icoj^-

»ci»us. Each person can test'th6 truth of this by his own <x)nsci.yijV3ne^^ -And if the mind at first be unconscious of the action of the e:^t;ei;j:jf^/^^'ld 'throng the senses, and also Hilcbfisciousness of the powers wli)ch. prplipjo^ -oni* €?ki«tence and uilconscioushess too pf its own existence j)^r s6, itj^^t jj^t first? be without consciousness.^ The inind, 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 bdgin to act or to feel. . .

^ KW we find that a material body matle up ol bones^ muscles, CE^rLila^p, membranes, nerves etc.,*'a]l of T\'hlch belong to to the non-e^o, Oopiaina tha mind. Thisbod^«is related botli lo other eriatenres without ami to the minU within: it is a medium between tlie mind and existences external to itself. And the -first elFeot produced upon ilie ogo by or through ihis body giv<^s.tUe mind Baerely that state of activity which tvo call inteiisifioJ paaiv^lj'. The mind does not yet itottce; but It po&sessofi more Ihaii mere paaaivity : it does •not yet put forth*it^ energy in any defiuile directioQi but it poaaesaea energy. •But in a Mtfletime after birth, by being continual ly acted upon by llie e:^lt;r-nal world through the senses; the mind^s intensificaliou is increase^, UX^ 't3 energies start in definite directions, and tlieii it notjceg* .^.^ggl^ilj^^fi^^nqiices.
By the eye, the ear and ttie other aeiises^ H notices existt'nces: but ihe wuehi:,

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the w^EN, the what, or the wht, 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 e^istencei^ a^iiong which the ego is placed, and with which ihe ego itself must be contemplated, are those between the ego and external non-ego directly, those between one external object and an other of the non-ego indirectly through U&e ego, those between one external and one internal object of the non-ego throng the ego, and those between one internal object and another of the pon-rego. From each of these relations and from them only can we disorinunato and gain knoi^ledge. From the relations existing between the ego an4 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 i^ the one received. This is the mere noticing of an object by the n^ind and it constitutes a fact. But if in the noticing of an exteraal object of the non-ego, wkich 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 extanlal object of the non-eg«, and we have a relation between two acts Of the mind itself, between two internal objects of t^^o- non-ego ; and also a-relation be-tween each act of the mind and the external object. And hence among these relations, tbree comparisons may be made, viz., between each act of the mind and the external object, and bet^s^en the two mental acts inter si: and from either of these comparisons, the mind<ian gain knowledge.. From the com-parison between the action of an external objec); of the non-ego upon the ego and the act of the mind itself in return, we gain the knowledgd,4hft the act of. the mind itself and the action of the external ohject are separate existences: and from the comparison between two acts of the mind itself, we can also discriminate and gain the knowledge ^f separate exiatenoes* For two acts of the mind in the same direction can not ba^ simultaneous: and the interval of time, however small, forms a relation by which the niind can discriminate and separate internal existences. Separate exist3nce3 hereafter we will call heteba. (Greek— heteros, a, on— others). We use the neuter plural of the Greek adjective as a noun, meaning other things — separate existi^ces. And hence the evolution of hetera by the mind isthe 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 rcls

tion existing between the two, the mind can evolve the knowledge of hetera. And we millet 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 ihings merely noticed by the mind we call facts: the knowledge gained by the comparison of noticed existences, we call truth : and this is our drst elassiflcation of the existences of the non-ego. Facts then, are

'«x7hitences, cadh one of which is noticed by a single act of the mind and without comparison : truths are the results of comparisons made by the xninid between facts and also between truths themselves. Now pacts are all

- compr^elided in the non-ego, and of them we may make tyvo classes: the (me class having their WHERE without and the other having their where wHhln the ego. The first of these Classes we Will call perceptional and the sdeond selfconscional pacts. And although neither of these terms are in common tise in our language, we think we have the right to adapt terms 4o our own purposes. From the Latin fractio, we have fraction, from which the adjective fVactional is constructed: and from perccptio, we have perception, from which in like manner perceptional may be made in harmony with the p)*inclples of our language. And thus, also, we may deal with conseie and prefix self.

A<i€ each of theses classes of facts m^y again be divided into five subclasses. Perceptional laets are naturally subolassified into the five classes, viz.: visual and auricular facts, fkcts of touch, of taste and of scent. And hence one -external aggregate existence— and by aggregate existence . we mean 9n existence to which we can apply our o/gans of touch, of taste, of smelly <rf sight and hearing— lAay contain five perceptional facts or external noUcealiie^xi^nces. Such an existencd as red, or an existence to which we can upply 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, 1)8 compio^d with the others, there will be ten comparisons of facts inter se of the BtLum aggregate existence. And if we compare each fact in an aggregate exist^u^ with each fact in another aggregate existence, \^e will havb twenty-five comparisons. And hence two aggregate existences contain ten facts and afford forty.fi ve comparisons, from all of which truths can be gained.

CHAPTER III.

CONSCIOCS TRUTHS.

In the preceeding chapter we explained what we mean by pacts and endeavored to show to what existenceS'we apply that terin. We showed that those existences whi<^ we call pacts, in and by themselves* separately considered, make no part of our knowledge; but that they are the foundations

and pre-exislent substrata upon which bM our kuowled^. stands and from which it springs. All knowledge lies in relations^ and the mind erolTes U by comparisons. Were a person so broQght^ into life that he 40ttld see the sun, 1. e., notice this perceptional /act, but notice nothing else, i. e., have no self consclonal fact, he could not know th%t the sun exists. We can not say that the SUB exists without having the knowledge •f existence. For, the phrase *'The suq. exists,'' er *The sun is," is equivalent to ^is, viz.: 'the sun is an existence. And unless we first have the knowledge ^ existence, we can not know the sun to be one: not a single fact but facts must codm to the mind before knowledge begins. - And when the mind first notioes a percep-tional fact, there is also always lodged in it a seU-conscional one; these facts, the one perceptional and the other self-conscional alway enter (he 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 peicepti^nal and self-conscional facts-keep c<»ninflr in a I)lnary manner repeatedly before the mind compares them at all: bat when it does once make the comparison, the knowledge of separate existence is evolved. This knowledge we call conscious truth. And heiice we say that^ we are conscibus of an existence though the knowledge of an existence be not a fact to us, but a truth evolved iVom the relation of facts: the Dftct of an existence per se is noticed but not known by us.

The relation of perceptional and self-^conscional facts is necessary to the beginning of consciousness. Far, 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 existenee 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 spjeak, 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 ; yel thai there was a time when qur consciousness di^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 aU things else in the universe, be cottsclous of anything except itself per se. And although the mind be conecioss of its acts, states and feelings, yet that it is not conscious of itself, i. e., .not con-scious of the FACT of a materia mentis, our. own consciousness teaches us. And if the mind be not conscious of the fact ot its existence, or to use a phraseology more tangible to some minos, if the mind* can not i^l itself per se, 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 npt be denied : and hence its conciousness in th<fee relations must haive 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 mtist con-tiatie uQconacious. And although^ it is often said' that tsonsciousness is the very thing titat distinguishes animate life : yet the lack of actual conscleuis-nesadoes not establish the lack of potential coni^ciou^ness or the nohentity of mind. ; Consciousness is noit the mind itself: the materia mentis tnuat first exist bef<E>r6 conscieusBess can. And if, as we have shown, the miud in €M:der to . be conscious, must be conscious of something, th%t something of whioh itiscioDscious, must be brought to thie mind itself by the external non4-ego:'otb^^ise the humah mind could rear a structure of knowledge from out of itself and independently of all things else in the universe. Con-sciousness, thefeibre, as it can not exist without a mina to contain it, so like-

wise if oa& 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 1ei 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 aftords the conditions necessary to become ' coDtcxotis when acted upon: we start no question respecting either of those . or. of wiy 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 inlfld gains, is cDkscious tkxjth. And if coBB^ousnesB depend upon the relations of facts, i. e., upon existences ^hich •are inter se hetora, it; ndust spring fh)n]L those Teiations. We may say, that tbe^iK^nd has- knowledge of something^ This sentence contains the mention o€ thme 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 oonscioasness be depi^ndent for its existence, then, if the later sen • tenoe lie trttei:cofiseidueness 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 tl»e -mi^eria mentis, and the returned action of the mind, spring conseieasnoNi or the knowledge of existence-. Consciousness is the result of rei«ti*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 wlMit is not true. W^ b^onite coni^ious of the 'exfstefnce of an act of mind and of a stove, and- the judgment then discriminates between the two by comparison. Coneiousness 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-conscional facts; there i»i^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-conscional facts evolyes twoconsoiONAL truths. The relation between the perceptional fact of a tree and th« self-conscional 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 tiuths can not spring. From the relations of perceptional and self-conscipnal facts, spring conscious truths, and then these conscious truths can. be compared promiscuously. Conscious truths, therejEbre, like perceptional and self-conscional 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-conscional ones, rise into consciousness, tiiey become conscious truths which are grounded in the non-ego. So likewise when self-conscional 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: conscious trutlis grounded in the non-ego, and conscious truths grounded in the ego. But that the one class is grounded in tiie 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 conscious* truths, i. e., two existences of wiiich which we have become conscious. Now it is said by some philosophers, that the miod does not oecupy space, i. c., that ^pace is not necessary, not one of the conditions pf its existence. But notliing certainly c^n be more absurd: for that, which dods not exist anyw^here, can have co existence. Because we can. not tell the precis^ WHERE ,in which it does exist, does not prove that it has aot awHSRE in which to exist. Ths^, which has an existence kowhbrs, has no existence nt all: and every where is a where in space. The ego e^^ists somewhere and in this where lie the conscious trutiis grounded in the ego: the non- . ego exists somewhere and in this where lie the conscious truths grounded in the non-ego : the whores of the ego and of the external non-ego are hetera of space. Now we must recollect that the conscious truths grounded in t)ie ego and those grounded in the non-ego come into existence simultaneously; the only things tlKiefore, wbich the inind can discriminate, between eoB'^ scieus ti'uths grounded in the ego and conscious truths grounded in the non-ego, merely as existences, are the whsres occupied by each, i. e., the wberes can be discriminated into hetera. We classify, therefore, all conscious truths into conscious truths grounded in the ego, and conscious truthsi groimded in the non-ego: and that tliese two classes of truths respectively are thus ffround'ed, the mind determines by heterating Ibeir wheres. Each of these

great classes of conscious truths may bo again subclassifi^cl. Tiie conscious truths grounded in the external non-ego are cMssified into Conscious truths of touoh, of tast^ of color, of scent and of sound; and the conscious ti'uths grounded in the ego, into hearing, seeing, feeling, smelling and tasting. All these, both those grounded in the Mon-egt), and those grounded in the e^o, are inter se hetera. A sound is not the same thing as heariDg,nor a scent the same as a sou«d ; any two of the same class or of ditt^rent classes, are hetera. And hence of the conscious truths 'grounded in the non-ego taere arc five classes, and of the conscious truths grorunded in the ego, there are five classjes, making in all ten heteuical subclasses of conscious truths.

CHAPTER IV.

. . NOMINAL AND TBOPOSITIONAL TRUTHS.

In the last chapter we endeavored to show what we mean b}^ conscious truths. We do not mean m}' conscious truths, truths which possess consciousness, but ekisiences of whose entity we' become conscious. And wq shoif^ed thilt we gain the knowledge of conscious ti-uths b/being able to separate the external and internal existences of the non-ego into hetera. This is the firs'; step in the acquisition of knowledge. And were we not able to do thisj all would be chaos; but this once done, chaos breaks and ordei* takes a beginning: and then we proceed further and discriminate internal existences inter se, and also external existences inter se into hetera. But, as yet, wc know heterical existences, we have the knowledge of existence merely as existence; and' merely as. existence, existences are all alike. A sGUud^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 otheV).

. 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 whiclrthey are related to the ego. And hearing, seemg, smell-

ing, tastlnff 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 visuarirapressions and seeing is different from that of receiving aricular impressions and hearing*. And this difference of mode or manner, whether there be any other difierence or not, distinguishes the five cjasses of conscious existences grounded the non-ego inter se, and also the five classes of conscious existences grounded in the ego intei* se. Thes^modes or manners by which the mind is brought into rektions with th« external hon-ego, belong to our physical organiaations, and inter se they are deferentia (Neuter plural oayliizeLg^m differehs, ens — things differing.

^ By DIFFERENTIA WC do uot mcan difierence,lmt things differing, hetera J

unlike. The. difference between two feet and one foot is oncfoot: the difference in area between a parallelogram and triangle of the same base and altitude ia one-half 4he area of the paralellogram : 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 understand suflSciently, so thai we can contemplate them otherwise than by the effects thefnselves, 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 conibinations of elements, each combination having ont3 element at least in it the same as in the others, we find ditfe rent colors to result, the difference between these comljiriations, is the adaitional element or elements in the one more than in another: but the differenct 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 leceived that name to distinguish the result of a heteration of a differentiation or of a comparison of tilings. Suppose, for instance, that every object of vision had possessed but oiie color: no distinguishing name then for any color to distinguish il 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 trutbs of the other senses. And linlecss men became conscious of the very essence of existence they could by making some possible discrimination give 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 \vould 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 wnlike; 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 differentia: and to distingui!>h these two existences inter se liy words, two namr^

are necessary. A name for ihe one existence alone, Tvill not answer to enable us to mention the other. If we should cali the one color, not color might 8tand, for the sound. But suppose now ascent alsQ,torj^e into conscious « ness: we have now three dijfferentia: 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 lan- guage, which has attained to any perfection, to distinguish the five differentia of coBscious truths grounded in the non-ego. These names arc signs of the results of the mind's discriminations by modes of relation among conscious truths grounded m the non-ego. A* lil^e discrimination is also made with like results among conscious truths grounded in the ego. But in giving these names, men are not naming pacts, nor are they naming conscious truths perse; but they are giving names to distinguish conscious truths inter se. Facts grounded in the non-ego pei se, have no names to distinguish tl^ciu inter se: conscious truths per se havft but one common name, to-wit, exis- tence; but conscious truths, which are inter se differentia, have five names ^ for those grounded in tlic non^eeo, and five names for those grounded in the ego: each ot the differentia is in language distinguished from the others by a name. Tliese 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, coloi, touch, scent and th^ 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 pro- genitors of our race would be likely to give names to aggregate existences first, as they would come in contact and feel deeply interestecl in them from the beginning. Bnt philosophically, when attempting to reduce our knowl- edge to Bcientific 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 con- scious truths, nominal truths; so the truths gained by differentiating nominal truths inter se, we will call primary propositional truths: because they are the firit ones that ca% be exhibited in propositions in which the words jjo\ NONE and NOT do not occur, and in which tkc subject and predicate are not represented by the same name, as red is a coler. And for the present, wo will dismiss from our consideration, tliose 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 nom^- inal truth of color, aijd s6me name to distinguish it from the nominal truths

of the bther senses : suppose this name ^ to be ocklor. And suppose that . an- bther existence, red for instance, sh^uhl then become a conscious truth. , Now if we slM)uld compare this new existence with allthe. otheraof which we had any knowledge, excepting green— the first color, we would pefceire that it was not on the same scale of truths, like «ny of them' in any respect. As a cons<^ious tnith it is like them all ; for^all of them are conscious trotlis. Bat 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 iiED with that greek, we perceive that they both agree in their modes of relation to the egO; and it was because the modes of r^ation 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 ease of red and green, the modes of relation to the ego are not differentia, but similia, aod hence red and j^een, as conscious trtiths, can not be discriminated at all into differential nominal trtiths; but we must proceed further and discriminate Inter se nominal truths (to which both red and green belong, and therefore the word coloi^ is applicable to both), into primary pi*bposillonal truths. Red is discriminated from the conscious trufhs of the other senses, in the sariie 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 greek inter se* And to do this we must necessarily discriminate colors* This we are able to do. And the reason that wo are able to discriminate colors, lies not in their modes of relation to the ego, but in causee, which are differeiltia working thrcaigh 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 distinguished by the name red and the other by greek. And hence we can say.thrit this color, this nominal tiuth distinguished by its mode, is among trtiths of the same mdde, distinguished by the name red : t^is color is red. And if ^e add another color to our list, we must deal with it in like manner, andffhnilate it with the nominal truths of color, and then differentiate thes^ sitpilated nominal truths into primary propositional truths^ and so on; through the t5ol6PB. And if we now call color a genus, as is generaMy done by logicians, we will then have species of color. And thus wo nday deal with sceMs, sotirids, tastes and fteellngs.

Axid hence we see that primary propositional truths arise by comparing, and generically similating and specifically diflterentiating nominal truths. Attd'Hhese primary propositional truths, which as primary propositional truths agree in eveiy respect, will of course, be classed together, i. e., will haVeacommbn name for each and every one of the individuals thus alike;.

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}ust as all nominal truths inter se simflia, will, as nominal truths, have a ^ common name. Take the primary propositional truth red, and suppose two hetfi-ical 1110)8 ta be before us; now 'two heterical reds as primary propositional truths, are exactly alike in every respect, starting from ihe pacts, -which lie at the foundations of them. They are both perceptional pacts: both are conscious truths grounded in the non-ego, both are nominal truths, and both are pri|nary prepositional truths: but we can carry our discrimination 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,^ existences grounded .in the non-ego, discriminate them into hbtera, 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 Jnto rythmics, melodies and dynamics: these last are secondary propositional truths. Non-musical sounds too are frequently subclassified ' by calling to our mind afid connecting witli them some object which is supposed to produce them, or some state or feeling of the mind itselt, 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-ciabk 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 huve 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 enteivinto our daily ♦concerns of life, and from which we continually reason. We have already shown hetera to lie at the very ifoundation of our knowledge. And although the UNIT is the fir* ot 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 knovvledge 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 ai 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 after-wards. Ordinal truths are simply the relations of separate existences a6 ex-istences 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 exiitence. And in point of time the ordinal truths or numbers, philosophically considered, must cotoe to our minds be-fore 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 com-pound or colligate them and name the colligations (for in nature they will be similia hetera unlike) and we will then have the caidihal truths or num-bers. Cardinal truths, therefore, are collegations of hetera with a defer-ence inter se of one, and they are distinguished in language by the names one, two,\hree, 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 differ ing^n 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 ihese 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 can not place after the word two any differential name by which we can express, in the concrete, the numerical sum of a horse an& a potato.

But a^jain : we have already seen that facts, the one perceptional and the other self-conscional, enter th^mlnd in a binary manner, and from their rela lions, 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 ^ind 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 lime, which is probable, we will not discuss. But th^t a man can not see or hear, i. e., that the miSiii^f^Snii^PiJgfS the same

mode and direction in either hearing or seeing twice at one and the same time is evident. Placeman 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 sametime. Tlie 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 WHBREy 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 theni we call SPACE. Space is a truth which forms a class of truths by Its^f alone. Wheres are- necessarily resolved into lietera, 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, w^e necessarily resol^^ times into hetera. Time also is a truth, which forms a dass of truths by itself. Mr. Hume derive? our knowledge of spaxje from color. And if a color cover suflBcient space to be resolved into two or more soMEWHERBS, spacc will be evolved from the relation of thosQ wheres: but if only h 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 jpoint 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 Wni. Hanailton calls sptfce "A native idea ot 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 tlie mind itself into hetera, of ordin,al, 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 tp non-entity, stands al# the head of our inquiries. Existences are then divided into perceptional aLd self-conscional facts, and from ihe 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 propositionai 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 sauie name. We then evolved secondary propositionai 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 matteri and to escape from the obscurities and perplexities, which in our opihion, have hitherto surrounded those subjects.

CHAPTER VI.

CLASSIFICATION OF AGGREGATE EXISTENCES AND OTHER TRUTHS.

Havitog^ready considered those *imple 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 ajicent, all situated in one location. Two existences grounded in the n©n-ego and related to the ego by the same mode, can not occupy the same where at one and the same^^ime : for it they do, the existenoes can not be betera. Thus : two colors can not exist in the same where, nor two sounds, nor tastes, etc, aVhe same time. But the five nominal t^ths grounded in the • non^go, nevertheless, may all be found co-existingL^t tl^e same tizne 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 gtegaria,have alsocapacial 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 spaee at the same time; one of them must necessarily exclude from its where, the other, or they liioth could not remain hetera. This capacial gregariupi of aggregate existsences i» 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 -

tlierefore, is one of the essential capacial gi^garia of aggregate existences : if

matter did not possess impenetrability each particle might annihilate its neighbor until the earth becamq a non-entity. And another essential capacial 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 gregaria: one will not have a lilse 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 : heatmay 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 differentia, it will form classes of fluids; and those which are not to us differentia, may be called by one and the same name. The knowledece of all classes of fluids is gained by differentiating their gregaria either facial or capacial': capacial as well as facial gregaria being truths grounded in the non-ego.

And when men begin to examine matter closely, they find that tlie particles composing one bulk may be analyzed, i. e., discriminated into differentia. And hence they form classes of what they call elementary substances, i. e., aggregate existences, the particles of "which can be discriminated into' .helera, but not into difrerentia. The ancients knew but four elements, vis^: earth, air, fire and water: man has since found a great many more elementary differentia. And efery differentiation, that the mind can jjaake, throws new light upon the world ^d adds new truths to our store of knowledge of the elements. Now the number ot 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 fire 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 ot course make new classifications according to the differentia discovered. We have matter, now, classified by its specific gravity, its attraction of cohesioa, 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. Chemestry is a succession of differentiations of elements and compounds, i. e., capacial gregaria discovered by experiment. And what is very strange, the mineral

enter ioto 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 amonia: and then the carbonic acid and amonia unite and form the carbonate of amonia. Now the menial process of similating and differentiating hetera, giTCs us all the classes, which we possess, of the different kinds of compounds 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 perceire 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 inferences drawn from the gregaria.

Kow after knowledge has increased and language been inrented to express 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 werds. The principles of the declentlons 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 differentiates, cotyledons, radicles, plumules, etc., and as the plants grow he finds buds, which he in like manner classifies into auxiliary, accessory, adventitious, 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, plantigrade, etc., are classes obtained by the differentiation of truths. And this can ^easily be shown to be the case with ethnology, entomology, mineralogy, anatomy 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 everything e1s| 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 ppints, which can be discriminated. And in every other sense, the word* is misapplied ; and* it is thus when we use extension as synonomous with space. The proper meaning of the term extension is the stretching out of something. And if we take twp points and consider 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 extension: 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 discrimioation of heterlcal points located in something in space, or in space itself. The consecutive points must all be in some existence 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 tiuths, i. e., there may be heterical extensions 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-
lore, each makes but one class.

But again, if we take an aggregate existence, -a piece of iron for
instance,. and move it to another palce, 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-
enifc 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*
itself a cla$s of truths.

But again: we hare in our minds testimonial truths. And testimonial
truths are tbos6, which we .receive upojl the testimony of ^others without
bringing them up from facts for ourselves. And every witness must testify
to 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 pacts. For
some truths, we are entirely dependent upon the testimony of others: as that '
Csesar was assassinated, Columbus discovered America, etc., while there are
others, which we may gain for ourselves from nature and also, receive them

lrop^>t^^m^V: as that Uid sun and moon shine upon CEina. And respect-^'
ing those jUrujtf^^ which icife cbhreyed to 6nt minds by llhe IMtMony f^ottms,
it is to be ol^rved ihai there must iJilway^ be somie'analdgyihAiB Whole 'or •
in tbe parts, between- a truth relfUt^d tp us uid so^e truth of which .we already
have the knowledge: otherwise we can gain no knowledge by such relation,
slu>lild there.be no anido^ existibg between the truth, which a friend desires
to z^alte IQ us« and some truth with whlc6 iv'e'arealre&dy faihilfa^, uo'con-
cepj^on<>F the truth in his mind can be established bywords In our own.
Tine ^i<^|^|»f Qia^ is sai^tei have lauded wheii ti^ld'ihat Water, fliildld,^ Would
conjpu|^^4,l^C9me >c^^ had atreadr^ii^ knowledge ^ >

a aqlidi.or fl^i4^^e would liave had nothing at whldi to liugh: ibiFfie eottld
haTek|ipV|n nbtiiing about the subject Of the conv^ersaiiohJH^ a tr^^er
slM>]ujid di^yerin some unexplbi'ed'co^ an ahlmal^th feet like ihose '
of Wcow^abpifji^likeiiWef alizzaM, knd a head like thirt -of -k crane, by
uaii^ these" things with whibii we are familiar to explain th^ apyeataflee^ of
ihi<| Yi^loj^i^'part^ of this newly diiseoyetfed cteHttur^, he could giVe ds a con-
^
ce|^tk>n o^ hfs atniinal as a whole. But should a traveler disqpref tM ailiaial,
whic^ in i% whole oji^ In tig parts, Wits enttfelytknlifce any thiiiigf<rff=^hieh»'
-vra baye any knowleufe, he could not possibly, 4[>y language, ghre uSany eon^
cepfioa of whiit'.he had seen. And in order that we might -gain any kHowl-
ed^ot puph an jmimal, we would haTCto seethe anliiiaMts^lf, oi^ have a
pictnre or sculptured image bf It presintifed to us. ' ' . -

Bnta^alin: wehave thekhowled|fet)t' existences of the imagination.
Thes^ exijsti^nces are peculiar and require some cfdiislderatkjnhei^. Centatirs,
S{%ilf5,fl(TOfes, Hydras, etc.*, are repi^csehtcd td,tis,'wnile lihes^ ereatut^a'
rei^y have had 90 objective existence iii natute. Yet thtf inind 'iier se hai^ no »
pow^r to create from noihing existences of any kind i even th^b^less fWbrio
of dreaiAs is not tlie creation of the Wind from nothing. ' "Biit ^if ' existei^^ >

*
of the iinagim|tibn have no real objecflve exiBtdnce, and If the mind cii^< hot create tl^^ Ihrpp nothing, ;whehce do* they come t^ be subjective ^istences?' The sfaii^ of th<^ ^ase is this, a eentaur,'and all 6theVextst^ces of thrhkh^gi^ ni^ion„ thQJiigh they have no real objective exlstenbe ih liature as a^cbffibina^ tipn and whoXe, yet all of them, partially In th'S \)arts cfonsidered, havea real ob^ectjb^ eifiste^ce. A centaur is an existence of ; the iniiginitf on, tfee parr 9f whic^ ^Vi? that pf a iiian, and the other like that of al hdrse. Both' of thft pwts jSepwat^ cbiisidere^^^ a real objective existehee in nature.'

The |nMyi^|nat|Qn unites these parts ' and frbni theit' comblnatibn create an fx^ten^,'which has a real subjective existj^n'ce, but v^hidi'as a wl^e, a unity, has no objective existence. Biit had the;partilr, sejtoately' tonsMered, 110 o^ective existence, their unity could never haVe* had yjstilijective exist** ' enee. All the. ima,ginW. monsters of ancient and'' ^^^^ ti^erhave b^n fwrwkcd in this manner.' *rhe' images in %orkg of flctlbn, the Qods bf Honi^i

th? Metamo^Rkftfe» of Ovid, and tUe cliavacler of flamlet ^^nd :6^e1&'(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 of cause and effect, it seems necessary to prepare the way by examining' tin? manner in wfeich we come by tbe knowledge of these existences. Now v^t can gain no knowledge ©f cause except through effect. We may know ai^nic aSi 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 greg|arimn is <Jontained in it, is found out throu^' the effect.'* We can not yi«v objects, which are potientiai .causes, and per se. determine ' suoh to l^ their case, a priori ; it is some effect of which w^ fiMd gaih tfee' ' knowledge, that brings to our minds the. knowledge of cause. But the veigr.iijstai?! we lopk upon anything as an effect, we have the knowledge ^f cause: for, cause'^and effect are but counterparts o'f 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 prdducecl.* With- out 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 nieai;^. however, thaL that of which we can not conceive, can have no extfetence : ail, we mean is tha^e can have no knowfedg^ 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^kce, 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 tnowledge 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 iier undergoing in appearahce, continual changes, (and this they coiiW not

have avoided if they looked up) could Iheyliave evolved the tinitha of * effect and cause from -these phenomcita alone? We think they ftouldnot. If tie

• first changes with .which men became acquainted wfere those of the phases of the mo9n, and their minds were not yet familiar ^ith the exertion of any power in nature to produce 'change, providing .they really Jbelleved -the'-old and full moon to be in reality changes in the same^^otPlndhjated by

phenomenal diflfefe^tift, the conxparisoft of! these diEferentia. would only evolve Ofceknc/wledge of chaage. But that this change was the effect of some cauae^' could not be evplyed f romsuch comparison. ' ^

. Now the simplest cha»ge. with which , we are acquainted, and Which We can perfteive to be produced, to be an effect, is the change of aggregate existences in, space, i. e., a cliange of their wheres. Suppose a man should seeoneivory ball* strike against anothei; and send Ihnt other some diStance through sp^ce; in such case he would see a change produced, an effect He wonjd perceive heterical wheres occupied at different times by the one and same baU which' w|is struck, and. also heterical wheres occupied successively by the stri^ng ball : he would also perceive th^t some »f the heteriqal wheres of the one ball and some of those of the other, became, at different times, hbmon (Greek-^-neuter singular; from homos, a, on— the same). If we contemplate the two ballsj we perceive that they are hetera and that their wheres are hetera J and when the striking T)all mtJTCs' towards the other its cotffse ifmade up of wheres which are inter se hetera until it strikes, when the ball struck makes heterlcaV wheres. But so soon as the first ball strikes the secondone, some of tMe" fitst one's wheres and some of thesecottd one's wheres become hoinon, and from the impiesnetrabiltty of matter, ^this could not be the case withont the secOnd^ one hatmg Vacated those wheres. In this caste the change in space bf the second ball is seen, to be as . effect, and the catfse ii^asily perceived: The first ball commenced to move towards the ' seeond one until it touched it, and h«d it proceeded no further, no effiect wdBld have been produced upon the second one: but if. it go on further, some of its wheres and some ot those of the second must "become homon, i. e., the wheres of the second hall at one time and the wheres of |he first ball atifaother time, «re in space, homon. Now one iii^tance of change involv-ing such relation^ jf c<>ntemplated, would give us the knowledge, of effect, and cans6.i . ■

- -Bat a^ih, if we tie one epd oi/T a string Xo a perii|anent object and attsM^h'the other A||d to the one end of a lever, evejy pqint^^n that string will occ«ipyaT\mEBB,and the wheres of all the points inter 5fe be hetera^ The end of the leverto which the string is attached wii^also have a where, which, in reference to anypoint in the string, will be heteron. If now the.stiing eontraet, some of the points in thoBfring will take Uie wheres of other points, atti«6m^*of thewfceresof the end of ^the lever, and some of the wheres of pofiits'intlie string, Which were ^t first hetera, now become homon.. And helK^e we see that in all those changes of aggregate existences in sp^ce, which we^r^ard as .effects asod whose causes we uhderstand, we find heterical ex-fefenc^svrith heterical wheres, and some of the wheres of one and of another beebminghomoj^.' Change of o\«ects in space is also produced by what is called attraction and re^Hlsion, bat -what arc the causes and modus operandi

in these cbanges, pliil6s6phers have not yet a^iffiei^tly eKplained td us..^ The -conrertionof hetera into liomon among wherts, is the modns openuhdi in ^

those chtoges of ol]dects in space, t^hich we faHy nn^trstand. Take a- piece of irgn and keep it all the time for a certain pfriod under your eye, and. during this period move it with your hand fi*om one place to anotSier. lit* ' this case we perceive that-the existence moyed (the iron) remjiins 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 irpn and some of the hand's wheres can not be discriminated, they are homon, though the dmes of occupying them by each succassiv^Iy are nerer homon always but hetera.

^ But again, we sometimes see dl^e existence acting uponwa90theh and a ccmstltutional change following such action. Take a hammer apd with it strike a grain of corn placed upon a rock, end we will see that a constitu- ' tional change takes place in the corn. This change too, we could Ibarcely:. avoid regalrding as an effect the first time that we s^uld witneGfs the occnir^ rence. And in this case, it will be perceived that4wo h^ical ^existexicea . come in eotitact^and that some of the wheres of Uie one and some of the, either become Imhiob : and Auiber that some of the he^iea^ wheres pf th^ parttoles in the grain of corn become homda, mad heoee th^ coo^^utipma , change. The graiil of com possessMrigidity but thia gregariuin wm de-*, stroyed by reducing heterical wheres of heterioal paitides to hosgijMi; On, the contrary ignite gunpowder and heterical 'particles, immedialely take^ heterical wheres.

Again,*if we take a piece of ice in our hand and it mdl end. beccn^e> water, here is a constitutional change; ice, an aggregate existtaOe, Im: changed some of its sn^garia and become water: and ip changing ,the»e. gregaria, heterieal wheres ot particles became homon. And in thiaeaae wo must perceive thatithe where of the two aggregate existences,' ice andiwater,^ remains the same fer both ; •but the ex(stence» posseB»greg|H« imtereediffiRT^ entia, and the times 6f occupying the same wh^e jpe lieten. And henee^ when there is during a certain i>eriod ef tilhe but one where for IwjO di^r-- ential existences, the one must have oocf ^ied that where for a pajrt of th«A period and then become the other exlstenoe. And wherwe ceneeive wich ta hftve been the case, we can not help c9Bceiving of a constitutioaal ehabget having taken place. Kow in change times can el ways be heterated and wHen we can go arstep farther and heterate wheves, the^ change is that of . pleee. But when we can go still fUrtkef and peroeive that «» aggregate existenee has lo^t some of its gregaria and taken others, which witU reference jte the llrstare differentia, the change is constitutional. A pieceof iron when. ItelMed possesses different gregaria from those wbich it has when cold : this is owloi^

s-

^ftidoiififtiUiiioiiftl«haog«. It, however, oook agamand assumes Its fdrmer fV^gMrla.

Bat agaiBf if wo take grains of white sand and consider them all to- fetltflr iala piU) we il^dl hilve a homogenious aggregate existence,!, e., an folitfinoe is i^ich all tkQp«rticles are Intef se timilia: and consequently Ilie^'WlifireB 4tf. All the paitid^ can be heterated but the particles themselves opxiidtbd.diffiBEMitiaMvit now we mix red sand with the pile, we then find tot It jpAttkdfla which toe not only het^ra bat also differentia. The pile now, ^Imtfori,. ccmpared with what It was shows cliange. This change, however, if Qwiiig:entiiiBly to th« diange In spa^ ef the particles of red aifi white

■•ocL' ' ^

But. again, aoppose we take an aggregate existence in which all of the paiticlet loetimilia, so f&r ai we ean perceive, bat by subjecting it to a certain pmceu(mL£ad tlutt pffrtici;ea which we f^gardefd as slmilia have become plAinljr dilferantia, irhich is alwKyi th^ case in theahalyslii bf oompoands,' hflM ia ta Of ifbhonge of a ^diffdrent kind ifrom any of the former.

And again, suppose we take twoaggreg;ate existences, in each of which the partfctai inttar ai are afaxtilla, but the partkiles-of the one and those of the
fAU^ are iifiter ae difllsrentia, and wO' |iut these two aggregate existences to-Iptt&er aikd And that all the particlcis of eacK existence now, il compared with^ what £hey .were then, mrtf then and now ihter $e ^ifiereiitia, but among them-aehreathny have all became Nowaiiiddlta: 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 oV taeterieal ip^iles of particles into homonical wheres, and vice versa, which i»a eonstitiitional ehange of the adhe8i6n of particles inter se, as in crush-ltt|p«iideiipaiistoti{ the cbntMlon^of slmilia into differentia, which is the ^tMl^aifi^f a«omponnd ;'aindUhe conversion of differentia int0 slmilia, which ia-^eayBthesia of elMients, having chemical afflniiy for each ot\ier. Every chaagenddeh takes ^htce'atnton^ existencds of the non-ego involves theprin-cipiiea of iHie dr kfibther oi the abttte examples, excepting changes in degree. And IraiCan leaMy see that ^ne homonidal existence per se can not chaoge, Ijulthal tlia change of any one ^istence is owing in part ^o some other exist-#ttee. - Eratrf e^ange Ift dependent. Ahd as change springs from the illations ol^^stencas, within thdseTelationa must also be the cause of power to pro-dnoe^ohangei Soidittm pars se does not posse% the cause of soda; nor does ojQpgiBeolitainiltwAhiii itself; but fh)ni the telations of sodium and oxygen ^||(ib|p)|i4^tDi^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 komoii atid h^tt«/ or similia and differentiator commensura and incomeosura, we can not«Tolv« the knowledge pf. cause and effect, ' ..

T|iere is a change in the appearance of the iii4K>Br there is alfid a change in the state of the atmospl^re, by the cempariabn of these changioB, we have hetera and dafferentia,.hut neither homoi^or suuilia. And fh>m these things per se, L e,, from l^etexa and diffisrentia, or froni hoMon and similia, or> from hetera or.homon and commensura, weoannot evolye the knowledge of cause and effect: If a rock fall from the cliif of a mountain into the valloy,' and abaft 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 hoi^on, or vice versa ; similia intotliffi3reBtia,or Tiooversa ;
commepsura into Jincpmm^nsura, or vice v^sa; so that we can evfA^efrouv their comparison an j^ect or cause. Hetera must Qieet somewhere in hem«n or vice ver^;pr similia in differentia, 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 olasses rizi expended, acting and potential. Causa striarum of the rocks is an example of an expended oanse*: The floating icebergs, as believed, striated in their course the rocks. Btd^ they have vanished and ceased to beca^efif. The flowing of the water la Ihe river is an effect of an acting cause, and gunipowder unexploded £9 |ln exanl^:

pie of a pote;itial cause. . - \ ...

' . -

CI^APTER Vm. ^.

NAMES. ; ' * . ' '

We come now to the consideration of names, WheAire reaMm and • U8^ words, we must necessarily see to it, that o:ar words hate some definite: meaning, otherwise we will but' .veer about ^over^sutoectsa^ random wit}i#iaft making comparispns in such a manner as will evolve tr:Uths. ■. In the' anos^ common affscirs of life we reason either wellpr or ilU^lId w^ lead oQkm into our tra-ins of thought and rp^spniug by the use, of . words, ^ So.mneh hare ■words to do with reasoning, that Archbishop Whately conclude)^ logiO^^ortlMe^i science of reasoning, to be entirely conversant about lengimge: a mistake similar to that of supposing the symbol^ of ^Algebra to be the only things about \Yhich that science greats. But the relations of^e^stences inter se are^ subject-matter c^ the science of reasoning and dt every other science* And as words are used to designate tlie results of these rela^tlons, the wofda themselves must subjectively bear s6me 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 4t6 the subjects of the science of reasoning. And after what has alresEdj been said in th« previous chapters, we do not thing it will be yery difficult to undeastand the functions of words in the processes. of reasoning, "We huve already seen, that hetera lie at the very foundations of 'our ^mowledge. That which * is io related to the ego, that it may be an object between which and the ego, some truth depending upon such relation may eom^ to our knowledge, we call an existence. And words when spoken are to Ihe ear si^ns of cps:nitions of the person speaking them ; when written on paper they are signs for the eye. And when existences come to our knowledge tc^be existences by the power of the mind toevolvp the relations among -whicli it is placed into hetera, these heterical existpnces are known only as liteteraj and no one of them is distinguished from another except as separate exiflfenCes. Andfwhen we consider one of these heterical existences indepeiidently 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 tiie word written, one of hetera, without distinguishing in any miiniier this one from others. ...

An& h^ce words, for logical purposes^ maj 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* distinpiishing them inter se. To tW later class belong such words as existence, being, thing, en tlty^ phenomenon, etc. These non-distinguishing names a^e few in number in all latguEgeB. Axid 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, "Wfcicli distinguish hetera inter se. Names to distinguish hetera inter se are sttdh i^drdsks the following: this and that, thesaand those, once, twice, first,

8econd,*^go and nOn-ego, etc.

-'■ But ever^ conscious existence has a where, which it occupies, and the i rdations of wheres occupied by conscious existences are expressed by prepo-sflions.' The tvhere^ however, and the conscious truth which occupies it, are ^diffe^rentia. And we will, perhaps, be better understood, if we sub-divide that islass of n£nes, which distingtiish existences inter se,into six classes, tiz: namesof hom6n,of hetera, of similia, of differentia, of commensura and of int^mtntosuraj' and keeping this sub-classification in view, we %fi\l treat of them somewhat promicuously.

Kowltmust be evident that sometimes a simple word is used as a namej 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 ef the gregaria of aggregate existences, in the ex-

pressioD/^A red house," the word red showa that thlsf%cia,l|^fgar4aiii is one of the gregaria of the house, and of thig facial grf garium, it i? *th^ name. And all adjectives of the positive degree whQujoiAed to.ajggr^gf^t^ existences, name some one of the gregaria, fapial or caffi^iaU vftiich,' alon^^ with others constitute the j^eculiar aggregation yarned by the xieua to y^^^^ the adjective belongs. In the expression » "A good man," t^ie n^nh Qi^ i^ the name of an aggregate existence, and the^ word 'good^' which if jajj^odi with it, is the name of one of the capacial gregfiria BXipf^pd to be ^n^/^l^ aggregation. "A fusible metal," is an expression of the|aax9e j^d. A2i44]t is to be remarked that those adjectives which' ar^ the names ot facf^ gre - garia may stand alone lis the names of either the subject^ Qr predicate j<»f ^ proposition: while namesf of capacial gregaria require, i^ei^^alljyjn qju^' language, the names of existences in which the gregaria i^amed bj ^^eJba^ ;3«ver 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 w©, can not say that a rbund is on the table, and we should rather fj^f a.^OHi^d-thing is ofi the table. And when we wish to use such wprds, '^hlci^ are (be. names of capacial gregaria, as nam^s by themselves in thi^ subject of propo-sitions, we usually change the lorm of the word: thus round is ^ha^ged. io^ roundness, re^angular into rectangularity, heavy injta h^aviiuSjOr w^^^- etc. * ' . * ." ' i'- '

The article A or AN is continually used in logical pi;opositiona4ii^;^« always has' a> significance.. This article is the name of ^n heterical .rf)§ tfpa :
itisdeHted from anb; German ein, and means oixi^. Axtd tik^refQf[eg\\ip expression, "A red house," contaiqs three names viz: bouse, 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^^. of an homonical relation, and itis used to distinguish ho^xpn fjrom 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^op£ with t^ , noun to which the article refers: as, "The same. horse/' "The gate iti|^f,i* 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^ tban napieg.^ 'niej, however, frequently appear in propositions along with otl^ nWI%.; and th^ir ftinctions, therefore, ought to be understood. ^ :;

Prepositions are the names of relations amon^ e^i^tenci^ and ^*ong the WHEBEs of existences in space: as, "The log un^er the bridge" "Jn ijiAr house," "Over the river," "Beyond the tf ee," etc. Adverbs are toe namj^. pf : relations of time and space and modes of actiAg: as h|ere^ there,. then, fpyr^ ; bravely, dilligently, etc. We do not propose to treiat of words any fart^jir than it is necessary to the understanding of reasoning, and vfp haT^|)^r4ap9,j said enough about simple names for the present. ^-^^-^^^^^^ by ^OOQie

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But frequently !>everal words taken together make but one distinguishing name: as **A red color'* is the nailie of a single and simple existence. Again, "Charles Carrol of Carrolton" 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 dijstinguishing names of heterical wheres. Such names are called by logicians many woiided names.

But again, a collective nbun or name stands as a sign to distinguish an aggregation of aggregations: as, the assembly, a multitude, a battallion, regiment, etc. And wUten 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 geei^, a. Society of prairie dogs, etc.

Again: a geneial or common name is one used in the first instance to distidguiah an individual existence, either simple^ ©r aggregate, which has been differentiated or incommensurated from others : but each of those existences, which, with the first existence named are safiiilia or commenaura, must receive the same name, and therefore the name becomes general or common. A common name is the name^ of feimilia 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 intg hetera there is nothing by which we can distinguish th6m 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 hetericallj, 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 3oon as our eyes are turned awaj from them and thcyhave 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 hcwcra, must from a mentaj necessity, when not numerically considered, receive from us a common name. But it may be said- that hors# 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 fvoxti objects, which are not horses, for the name horse has already done that, but to distinguish them inter'se ; as black horse, white liorse, Arabian hoi-se, 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' miay also be common names, and they will be, if any c*lor, discriminated

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Now if a man should place before himself a horse, a tree and a stone, by examining them, he would perceive, tfiat the one possessed the capacial gregarium of animation; the other the capacial gregaria of vegetation, and tUe last, capacial gregaria of a different kind from either of the former. These three objects, therefore, would be inter se ditfdrentia: they are the three aggregate nominal truths,- and we may distinguish them inter se by the n^ynes animal, vegetable and mineral. And afterwards every object possessing the capac1aL,gregariumof animation and tlie horse, as aggreejate nominal truths, would be similia, and therefore it must be calftd by the nante animal. Animals, however, may be differentiated* into aggregate primary propositionab-truths, and so on in a like rnanner, 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 whicU 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 ofie commou name. But the facial gregaria inter se differentia are many and Jhe difierefftial capacial gregaria are innumerable; and could welfiudan aggregate existence, in which all the facial and capacial gregaria excepting one were like thosQof gold, yet as it diliered from gold in one respect, it arid gold 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 ^ame 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 gre^arium-of .animation, which distinguishes animals, animals are made up of various other gregaria, both facial and capacial, by which wo can easily distinguish ,them inter se. And after that we have sub-divided them into species, we arq still able to distinguish the individuals of the same species. Take for instance, the, species or genus homo, and after that we liitve divided, this species into the five races, wecan easily distinguish the individuals of the same race. Kature is so fond of variety that, in the largest; cities two men can seldom be found, who arc in all respects similia.* And this variety of gregaria o.ut.«ideoi 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 naije, and yet every. city, besides the juxtaposition of houses ku^d the jostling of men, has other relations and dissimilar t>latsand surtound-

ings on the earth by which we may distinguish them by the proper names Jjondon, Paris, Philadelphia, etc.

Correlative oames are the names of existences so related to each ot^icr that the mention of .the one suggests the relation : as f^her and son, hus-"band and wife, mother andiihild, cause and effect, king and subject, etc.

. A concrete name is the oame-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 nbn-€go ; iii other words the existences (for, names in themselves^an not.be 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 naAe are spoken, and therefore, they are concrete; and from this circumstance the names of such existences are called concrete. An abstract name is the na^ne of an existence for which the mirid 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 fiames 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 tb be viewed in the abstract, we change these names grammatically into noui^s: as whiteness, redness, blackness, consciousness, etc. We may however use abjective names to denote abstract existences, as white is not black, i. e., whiteness is not blackness. ^

• Kames have been dividedinto 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 mucli 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 wo«4 used as an indefinite name. The truth Is that such names as not red, not mam- 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., whfch have been called p^'ivitives; they certainly exercise the functions of names, but wo 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 thaij others, but because Mr. Mill is one of the strongest writers upon logic in the En^ish language, and the futility of the subject is, therefore, best shown froni his work. On page eighteenirof the edition pubjished by Harper & Bros., he says, "A general name is familiarly defined, a, name which is capable of being truly aflarmed 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." An(4agaiii on the same page, "A general name is one which can be predicated of each individual of a multitude; a collective name can ncHrbe predicated ot each separately, but only of all taken together."* ^Now upon the foregoing, we would remark that a name can not be affirmed of anything ; for, every expressed affirmation is contained in a ^proposition, and that, which is affirpied in any proposition, cap not be a name, as we will see, when we come to treat of propositions in chapters X, XI, Xll, XIII, XIV and ^Y. Mr. Mill, in his explaination of .names has all Ihe time had in yiew 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 suiiject-term ; a theory which we hop§ 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 before, "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 merely the attribute of another thing." From this, it seems that Mr. MilPs definitions of concrete and abslPact 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 nof 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 attribute 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 following 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 attribute). **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 previously. 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 thcee 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, connotes the attribute whiteness. The word white is not predicated of the attribute, but of the subjects, snow, etc. ; but when we predicate it of tiiem, we imply, or connote that the attribute wiiiteness 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 tg bring forward the truth and let it be examined. And we repeat the remarPthat all Ute divisions of names, after that they have been divided into names of homou, hetera, similia, differentia, commensura and in(5ommensura, are of but small importance for the purposes of explaining the reasoning processes. These fi\x classes Ho at the foundation and are used in assisting the undestanding'in drawing its conclusions; the other classes are useful, if nseful at all, merely for the purposes of distinctions in mentioning things, but they do not assist, but rathei* impede, the progress of science.

CHAPTER IX.

classification op PKOrOSTTTpNS.

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 sub-Stance. But of this substance in which attributes inhere, we have not been rtble to gain any knowledge whatever independent of the attributes. And we regard the name ATTRiBtrTE as calculated to mislead, and therefore we do not 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 wjth as muo"- ,

propriety at least be called existences, as those tilings whii;^ our tlioughf^, from our knowledge of gregaria, lead ns to suppose to be jn 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 abl^ to say with e.-^nal 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 spmelhing, and that there are otiier somethings, whose relations to the mind cause these existences, which we call red, sweet, etc.

Now when men were forming hxngu age, 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 inore suitable instruments. And it must appear evident to every one that had any person attempted to compose a treatise oa 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 ahaad of his generation in the knowledge of things, and to haye invented and explained terms which have cost the human intellect ^es of labor to furnish to us. But happily for us thelabratory (# thought has been vigorously operating for many a thousand years before we have been called upon to enter the arena of mind. Instruments for stampinfij 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 .

language chart of the newly discovered territory.

Now in the preceeding pages, we -endeavored to show how wie obtained and classified the truths of which. we treated: we also applied the names used for distinguishing them. At the same time, therefore, th*at 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, wlio puts his truths carefully into groups for future use, to fortify tliem with proper terms, as he passed along. This we have endeavored to do as well as we wer« able ; and then we took a view of these names or forts. Wc must proceecl, therefore, to connect those names, or forts, together aod 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 tliis

is while,

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 m'ade immediately by the mind is expressed in words; a conclusional proposition is one in which the comparison betw^een 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 compai'ison 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 eflect 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 frequentl}^, 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 wliich some efi:ect is produced: as beauty fades, water runs, leaves fall, etc. But all such propositions may be made by wording them differ-, enlly 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 sifow is while.

Now respecting the meaning of this copula in propositions there has been much dispute among authora. When we say that the sun is, we mean tliat the ffun exists is an existence.* Ihis, 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 teil 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 predicable quality over to that name. All this is certainly somewhat ojiscure. 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 me'an, say our authors, that the copula affirms one thing of another. But I do.hot see that any more light has been thrown* upon the subject by the cbaiige of phraseology. AVhen we say that ice is frozen water, according to

this explaitialion, we afflrpi frozen water of ice, when in truth frozen water and ice are the same thing, and therefore, in trnth, 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 explaination explains nothing. For, according to this doctrine, ice possesses frozen water, or frozen water belongs to ice — a mere jagon of words. • But it is said **That the employment of it (the copula) as a copula does not necessarily include the affirmation of existenco appears 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, how^ ever, is grounded in the ego, as the proposition asserts, "A fiction of Ihe poets." Although modern logicians have arrived at more certain conclusions, in very many respects, yet in thetr expositions of propositions, they are as much at fault as the ancients. Tlie truth is that the verb to be as the coipula 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, Jolm is a man, leaves are green, etc.i 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 regar?l 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 explaination of the wholfe 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 sometliing 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 mlcd a single existence cither simple or aggregate, red for iqstance, as the subject of every proposition tnust be, we can deny nothing of that existc»ice: 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: andlf we consider the

one as a reply to the other, there will, indeed, be a denial ; but contemplating

•either one of tbem as independent of the other, and it contains an aflarma-
tlon. And further, if this appeiar obscure, we may aalc ourselves, whether
iBoth expressions are realiy propositions, and if. they are, then they must have
som^hin^m common: proposition must be the genus of which each is a
species. If they be differentia, •and yet in some generalization s(milia, they
must have been differentiated from the higher class in which they were
similia. But if we say that the »ne affirms something of something, and the
other denies something of something, as is done, they then h&ve nothing in
common, exeepting that each iias a subject and a predicate, 1. 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,. tbis is merely a classification of the terms, and terms alone do
make a proposition, l^he classification'of terms, therefore, can not be the
thing in commoB, which unites all propositions in a common class. But' if
some propositions affirm and others deny, Ihese things (affirmation and de-
nial) are difierentia, and there is nothing left in which the propositions can
agree excepting the clleussification of terms. In the t\^ propositions "A pear
is a fnilt,^' 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,
.^ound 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-
sitioii^i^

* • What we consider, therefore, the proper mode of classifying proposi-.
tions is by the differentiating of the results affirmed. We defined' a Itrgipal
proposition to be the result of a comparisoh made immediately by the mind
between two existences expressed, or affirmed, fn wordsv AffiE!mation,.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, difi'erentialj eommenftural and incommensural
propositions. It is not necessary that we sht>uld take up each of these classes
ancUgive them fui'ther attention here; for we are only <Slassifying preparatory
to a thorough investigation hereafter. Some things have to be merely stated
atffrst, so that the explaination 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 ba one ii\ 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 whi<

two or more subjects are compared witli two oi* more predicates. What, how-
ever, is called a complex proposition is really a single proposition expressed
and one or more others understood, as "John is good and wise," equivalent
to "John is good and John is wise." Again, "John and James are good and
"wise,*^ is equivalent to "John is good and John is wise and James is good and

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 numl^er 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 psopositions is made merely from the appear-*ance given to propositions by the wording of them, and it is not a division of propositions, as sJhi, at all. The sentence "Brutus killed Caesar justly," contains a tesult which will be exactly expressed by another set of words, as *'The killing of Caesar by Brutus was ju^' ; a pxjbe proposition. The division has no foundation, whatever, in the nature of prapositions, 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 aix, EVEKY, soziCE, etc, joined to subjects or predicates qualify them and make them a certain kind of subjects and predicates, but the aflirmation^ ismade in such propositions, just as it is, where these words are wanting. These words, therefore, qualify the results of comparisons only by their qualifying eftect upon the existences compared in propositions, the manner of making the affirmation is in no way affected by them ; they beloiig 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 ispn'e in which a certain result is expressed as actually existing in the i-elation of existences, as RED is a color, red is not green, etc. An hyix)thctical 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 she^ 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-

tence is not hypollietical, but a categoi-ical 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, w« 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 greparia enterin'g into a kiud of fasciculus, which gregaria are the things in fasciculo for which the subjectiye 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 ratiocinitive conclusion, as -already said,Js a proposition in which the result of comparisons mediafelj^ made by^means of c^tain existences, 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 beeu denomiwited modal, by writers, • are conclusignal 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 Propositions, 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 cobcKision drawn from some premises, which are found in and can be made out of John's actions. What have been called hypothetico disjunctiv* or dllematic propositions, also, are coDclusions, as- we will more fully see and explain hwcafter. '

In this chapter we have endeavored to classify propositions so that we may be more easily understood in our subsequent inquiries. All truths,

especially tb(5se abont logic, are so inteHinkcd that we are obliged to dra^, sometimes, upon^those whose explaiBatioD has not yet been given in order to accomplish the worls on hand. And the subject upon which we have been engaged ibid which we must yet consider more closely, has been misunderstood, as we believe, by all writers heretofore upon logic.

CHAPTER X.
.homonicmj propositions. * ^

We have defined a logical proposition to be the result c^ a comparison between two existences made immediately by the mind and expressed in words : and a conclusional proposition to be the result of ^comparisons between existences made mediately and expressed in words. We will first give* our attention to logical propositions, j And the result expressed in ev^ry logical proposition will be either a truth or an error. If our faculties be in a perfect state and exercised in the right manner, the result will generally be a Jtruth: but if our facmlties do not act in a legitimate and sufficiently vigorous manner, we will obtain an error. In every instance, therefore, it is always necessary, in order to obtain a*truth by comparison, that we should have an adequate knowledge of each of the two truths compared in logical propositions. We have already shown that ail existences may be compared one with another, and that knowledge is a result brought out of the relations of existences. To show, indeed, how the mind possesses the capacity in itself to

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 sufficientiy 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^aining that knowledge, leave no trace behind. And did erery proposition clearly exhibit the two existences compared, and also ther^sult'or truth gained by their comparison, propositions would nd^d no intei^retatien, for each one would fully Intefpret 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 f xpression were of less importance than general availability and dispatch. And therefore, in every language, the truths which are really compared in propositions iire sometimes but dimly shadowed forth, and the result of their comparison always but obscurely shown by the form of the words. Arid this makes it necessary, in order to obtain a thorough insight into propositicXis, to show what the two truths compared really are, that the result of their com- parison may be clearly perceived. To this task, therefore, we now prdc^di;

And we win comtaence witli, the examlaalioa of homoaical proposiUoas.

Take the proposition "Red is red,*' and let us endeavor to clearly set ouitlie two things compared and the truth, wiiich is the result of their com- parison. And first, we must observe that an existence which is absolutely^ the same existence can not be two existences,. and that one thiitg per se can not be compared at all : two existences must always be found in every propo- sition. We must also observe that when we have the knowledge of an exis- tence, we can always make §ome discrimination respecting that existence :^or wiihouttome discrin;kination we can have no knowledge. Plurality of ex^ istences is necessary „ to ou% 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 *^ohn is John," or what is equivalent to this, **John is himselP' ? In ord^ to uhderstand 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 anU tho ego bring to our knowledge an existence (a tre^ 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*e£fect& Many effects upon the mind are inter se similia ; tbus if we look al an inkstand to-day, and to-morrow look at ItBgain; both to*day and to morrow it will produce etfects upon the mind exactly similar: yet these effects, will not be the same, they will not be hpmon, for they can be discriminated by their times. But aimilar effects, upon our. minds can only be disoriipinated by their times: and where there can be no heteratipn 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 affiscted by it exactly alike, yet to me only one of these effects would be grounded in tiie ego : and all the effects upon the minds of the others in respect to myself would be grouo^ded in the non-ego. Similar timfa% ther^Sore^ grounded in the ego, which can not be tflifterentiated, f)ut

whofi^times can be heterated, are not one and the same, but iseparate exist-» ences: they are hetera. But with respect 4o truths grounded iiLthe non^io^ though their effects \ipon the mind may be exactly similar, or to c)iange the form of expre^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-cgo, 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 thihg which would enable ua to know that these two rocks are not the satne, H that th«ir 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 fiow 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, tl),e heteration of their wheres destroys th« identity. The power of the mind to heterate depends qpon thp^ time and space.

Aad now we look at John and receive a mental effect, and again look at him aad« receive a similar effect, the times of these effects oan 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 ezistencea and ground them in ths 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 simiha, they, are objectively to us homon: and hence we can say that John i» John, or tha4; John is himself. The mind can ftlso 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 iyto that ot the nour^ego, *wo have aiready 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 JohniMsd himself are the same thing, or thattJofan and fiimsclf exist IQentically, or that John exists as himself: whatever: may be the words, and thdir syntactical relations, the two subjective existesdes, each of which j^e call John,* are'-objtctively 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-^ sitiohs which defiimd words, i, e., in which 'the meaning of^ a word is ex- plained by some synonim or equivalent expression: as faithfulness is fidelity.

1. e., the meaDing of the word faithfulness and that of fidelity are homon The Mlo^ing propositions are similar to the one first spoken of: "Bun is the Bame of the orb of day," **Death is the name of the end of life;" "Term is a name giren to each of . th^names wiiich distinguish the existences com-parcJd in a proposition f and so on. All o|^ these propositions iff e homon i-cal, homoii is affirmed fn each one of them. ''

Such propositions as the one above have been called verbal, because the existen^s compared- in !hem are words. And accordin^'^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 afl^^med of another; the only thing that can be affirmed, in such propositions as we are now treating of, is homdn. In those propositions, also, which a?e 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 figurei having three sides and three angles," "Ihe eye is a physical organ by which we see,'' **A primary property of mahef is int^enetrabllity," and so on.

But in the proposition "John is John," whicH we considered a little while ago, we notice that tfoth theisubjcct and predicate ai:e aggregate exis-cehceSf and that each one is compared with the other in the aggregate- m a totafity. 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 b6 compai'ed in the aggregate in all homonical propositions: for an aggregate existence, as a totality, can not be th€ same a^ a simple existence, a gregariuni, and vice versa. But there are homonical propositions in whicli 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.

Womust alwj^s keep in view that in every simple proposition, two existences and only two are compared: in logical proposltidns these (wo ex-istences are immediately compared, and in conclusional propositions they are mediately compared. These two existences may be, each of them, sim-ple, aggregate, or collective; yet there can but two enter into the comparii^n in the proposition of which the restilt 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 "^rhose work we are acquainted.

Now when we say that*Snow is White, or thatlrdn is ' fusible, we might believe that sno\^ 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 pfToposition, the two things which are really compared, we have to state the proposition thus ; One of the capacial gregaria of iron h fusihilitjr, & propogition in which a like result is obtained as in the other, and in which two simple existences, which ai-e the things really cepapared distinctly appear.. And if the proposition be stated so that the homonical nature of it also ^l^all

clearly appear, it will read thus; ofe of* the capacial gregaria of iron apd lusibility are homon. And in all hopaonicai propositions in which the subject is an aggregate existance and the predicate a simple one, it is only one of the gregaria of the aggregate existence, that is compared. In the proposition, Qataline was ambitious, when the things actually compared are clearly set out it will read One of the capacial grygaria of Cataline was ambition, i. e., one of the capacial gregaria of Uataline and ambition ar^ 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 ex^a--tences; 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 sai4 that the predicate is affirmed of the subject, or that the predicate is contained in the subject and so on, all of which expressions iiot only give erroneous notioj^s,of .the nature of propositions in general, but per se they are .utterly false: for the existence which propositionally is called the predicate is cotfk-pared with the subject and the result of such comparison is what is affi]:med in every propositioA, And although fusibility is one of the capacial gregarfa 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 in the ego are compared : and in the proposition Ir^n is fusible, two fusibilities are sujectively compared, apd 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 £0 also of predicates, it wovld 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*, alonfi; with subjects iind predicates : but homonical propositions in which these words are either expressed or understood need a further investigation. And when we say that AJl iron is fusible, which writers ha^e called a uaiversal proposition, what do we mean by the words AIjL iron ? As iron fs an aggregate existence, let us first examine a simpler cdse; 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

&7

i GMt f«d, it OAuH Mt <ytdMtlTely hit tiie flaaie thlBs^as the siHbJect,:^Uich ' ift fed. JTow Utit«xpl«tiifkMoii •»!! easily. Im applied to taravel th^ mysteries ci the pirei^itifm Jul iron is fusible.. For this proposition may be thus «IIMI, Onepf theoapaeial srtgarinm of aU iron and fuslbili^ are liomon. And from this proposition, it must appear, tliat were fusibility lackivg in an jigcrefate etiattaoe, that existence coald not be iron. Fusibility is a n^cesr|;ri^;ariitm in any aigriBfate existence, which ve distinguish by the , Iroi^; and eoDsequefftbf it must exist in thia piece, that piece, and in <all l^eoes Of aimite iigtfregatlMs.

"' 'She wM*d AiiL atandkig before ii^n dees not indicate that the mind jbvsliuinre made what it uMially called an Eduction, 1. e., that the mind from aUttMl number of instances has determined the lawa of nature to be unii^rm, and theielilre thla piece and Uiat pieoe wiU fuse. The discovery of the cas>ai^aI:|^regarhUik,l^ii^Uty, in one single piece of iroo, If by this gpegarium w» distin^lJ^ an^ggregate existence from others, and mark the 4istiootlon

by the word iron, will enable us to say with c^tainty and truth tl^&feAU iron itfoaible; fMrin dokig so, we merely state that on% of the necessary gre-gariia of aof aggr^^ate existeiipe, which we distjij^gdish by the name iron, and fafdbHJty ai» komoa. That there may be oUier gregaria in the aggr^ation, of whiok as 3»et we know nothings does not chaoge the cas^^^t alL

fiap^o0ie ft^MTSon to 8e tatoi into a .large room in which tiiefe were finuf Idndt dr bi^ls upon di|ferei(t shelves* around the apartment, and he be nequired to give dtsUngiilshlai, names, wMch would enable him to speak afterwards atoot the balls, rcapecting merely their taste; and colors. He wouldlake' up the first one at hand, and perceiYethat it. wais of a red oolor and ted a^w^M taste, and therefore he would name this ball A. Then every ball in Hie raom that was red and sweeties balls of colors and tastes^ which are intar-se similia, temti^t be diff^ntiated, must be called A from « men* mi flfeceasity. Attd by tlM name A, they are aflerwards distinguished from those that are blue and sour, which might be called B, and from those which ai« -iridte^ffid bitter, wkich might be called C, and so 09. But. so soon as hd tedfiveiiftheiiaaie A to distinguish the first ball of a red color and f^rei^t taite-Adm olhets, j^ llalls of a red color and sweet taste mxmt b^ called A, $mA it so, .fionid he not imaaediateljr afmr naming the first Jmll. hate iBiM.11^ pferfbet oefft^nty laad truth th^t all A ia red anil i^l A is sweet ? Aad if aflerwardtf, i^ifed ball M^wild be fbund that was sour, it would^ot be «i A;, but itiDttat be called 1^ some otliernamo*

V. B«lJ(n IMian, before tlie dtacofreary of America, might have said that |H«MBniefiedtforliehad never sedn^y man of adifferenit color, yet ^Is igptfldn wotM not l^tm been true. The apieienta alsc^ might have said and d&aaaiv thirty 1^ awmns are whitf^ yet «uch i» not the case. AM thercrror in iSk Ibeatf «aseli lie« in taking the gregarium of a particular object or objecu

and makiog: this grej^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 Uiiftgi ' red besides Indians, and other things white besides swan's, Wlgreli aaHnnto were distingtrish^ by <i Ames: the 'color was^ not«^nd«of the gregail« bf wbich these objects were liecessarily^distingtiished.

Bat we have said that aggregate existences ar^ dfsting^sfaed inter se by the facia] and capaeial gregaria eo^zisttot^. And hence did one i^gM* gate existence contain similar facial but not similar capaeial gregaria wUh • another, the two aggregations would pot be similia, and ^eycouM Bot be itt*-telligehtly distinguished by the same hame. A distinguishing ntfiie'' is & word taken at pleasure to distinguish existenc()s inter «e; and when ft BUutds 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 diflfer and conseqiiestly We can not speak t>f each intelligently «ttd 'use tlie rtime fiame. i'- ' " n . n

But how then, say you, is it that a black swan and a'.white4>Det mity both be called swans? SiVnply beciluse'they are diflbreBtiated iBto swaa'a irrespective of their colors, just as wfd. and white, as we ^faftve 8een,nBre fif@t diffeientiated into color, aBdi4hen distinguished ihter %e, by the name»«^ iM aM white. Alb men are mortal, is a proposition of the same kiBd.as Ail iron is fusible. Mortality is due of the capaeial gircgaria sine ({idiiion 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 afSrms hocson.of mortality and iDue df the Gapa«ia(spnh-
garia Sine qua non of man ; the second affirms mbn4aid one of the/aggi^gate
existences called mortals to be homon. All^«ien are aaiitfals, and, All sheep
are animals, are ^milar pjfpposilions.and tiieymay he thus' interpreted: man
and one species of animals are homon^ sh^ep and "oike speoieftiof animals ate
homon.' *

But to pursue further the effect of the- word ali* in prdp«8itfoB8,^if
when man was first plaoed upot>; the earth, he had HyM to 4he age of ten
thousand years without a death occurring^ and if ^during that^riod lie Ittd
invented languag^s^aUd distinguished hiUMMlf by the name man, it is plaiji
that mortalilj^ Wuld not ^ave been in his^ mind one of^it^ capaeM gie^
gariaof himselt: he wotild not «t least have known tbis by direct obseranfe-
tipn. And if during this time, so constiMtonal -changes 'among^ exjteraAl
objects had come to his knowledge, it is evident tfaat^e woald have; known
nothing at all about the capaeial gregaria of objects; but all the naones In
his latiguage would^ve been signs to distingtiisb slmplenexiiifeeo«e»iBtsrae,
and aggregations of f^cifld 'gregaria. Atid therefore lall ttoe iigg^gat» «tis-
lences now clasaifled by their capaeial grfegarla and marked by dMcfguish-

lng«Ma<eji .^yl&nld iiaye l*efiuimed tmclliflsifi^* And tUiea each en^ of ^Iie
km\m\ gr^gMria, wliicli^^was a sin* qua boq o£ aoy class, wcoild havebeeo a
aeeesflity ia order that any object might have been called by the name given
t»: ia^vi^Qais (^ the cliss. ^ames^ (4 Qottrftt, nailer the oircumstances
wmiM hare been few in iffimber. Bat snppose now, that at the end of the
piviod abo'TO i^ken of, one of th^ human species had died, here wonjd have
Meat' to i&aBkind a new truth learned by obaeryation. Aud were this instance
off death Uwn madc^Snown to i^ the living, all subsequent deaths would not
iiMre been new truths^ Iml other instances p| simUar truths. And. although
BOftdrimUe est |^em or son sioUf ia •unt. idem, objectively, yet sulijectively
slmili& are tke siune Hijng if li];ae.be left out. of the question. And hence
Tia|Wirrtt\gt^e knowledge of truths in the^ind, the repurrenee of simiUa are
vecMde^ and often spoken ot ^s other, instaaces of t^e same truth, althoiUgh
they are not homon but siiAilia ; their times are hetera and therefore, the truths
tm aimUia, but w^iTe thieir Umes homon, Ahe truths also, would bejsubjectively
hmmon. ^ov if we haare gainedthe knowledge of one individual of simlUa,
^m base gata«l &li the^'uowledge wQ^will e^er have of the similia, except-
i^ lhc|riim»ber or instances. A,nd.tiierefore after one death had oQOuired,
^A quesrtioa w^uld hate been, mending sinulia iu those gregaria which tp-
St^Ousr make th^ object 4iMin4:iXi8hed l^jthe ns^e man, is death ^ne Qf these
eapacial gregwrlaT. That it is^oould have been proved tp men under the
"atipirrcircuAstaiie^s only, by a proceB9 of^ reasoning whiph we^ball develop
]Mf««ft». (See book 1, chapU x^lO But ae. soon as it is^established to, be
tuoliv it ia asine qua non of man and he^ce we^si^ that deat/h and one of the
eapacii^^jregarla oi tdl -men are homon. An^ as aggregate existences are
eetptopoaedijof certain facial and cl^clal aregarla, which are the very things
n^iolidistinguislr.them into classes of cnmilia, whep any one of these gre-
iJaria sine qua non is known and given a name, it may be made the predicate
of an homonicsil proposition, in which the word all names the sum totum 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^ds |i ^iue qua npn of iron, is a necessity of our minds. It may be said
t)|at fiK»ibility is not a gregarium.sine qua non to distinguish iron from other
th}n|i:«; 0>r jgold and other metals po^ess it. This is true ; but go one step
bmk uito, the class of things called. by the name metal, and We will find fusi-
hitMfio^e^OQe ot the distinguishing gregaria, and in subclassifications this
.fregi^iU0|rS|iUst.p£^ into each of the subclaJses; for they, each of them,

uadfMr ^i«»|iame ^etal possessed it. And hence, by adding the words all «9A WWiT to Uie name of an aggregate existeqce and then |;pakin|; the t£RM ,t|Hl sii]^^}e^iYJ9 one of . an hpmonical 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^AOial grtgaria sine qua noii of g#ld) and proc^ again^ tiw^ffiid of nitrloacifl atf» homoD.

But we must nam exuaiiiio t^e Ijuaotioa of Ikeword ioicsirtoifptocod befbire the nattie of an aggregate ^xistenee in a pvogpositien* Take tMiMeopo^ sition Borne ink is r^, i. e., one of the faoial gregitria of sonii ink aisd bbp are homon. Now it* mast appear that the iiaaial gregfff Ivptt here amationed is not a sine qua don of ink, but that it is one Whii^h'^eom^ared with <iofli»fither color, enables us to diff(»entiate inks. 6oiqb th«efi}ire, as it nones the part of a whole, shows also'by being plactd belbre ^Mi aggr^te exJiteace ia homonleal propositions, that the gregarium, which ti^g/pean aa^simipli «d»^ teuee in'thei)redicate, is not .a sine qua noa of ttie class eC* aggr^Bpile 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 pufsye the siibfecfi 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, hwHiVCf; set down sevOTal homonicid propositions in^HkO language that is tlsed ta comttun^ dis- coi^se, and^the reader can change the phraseolog)^, «o as if> make tie tinit affirmed appear plainly to be homon: 'Somemea 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 distence betuM^en two plants in spabe^ Ice is firozen water; Sohuyl^kill is the name of a rlTOr in PoDnsylvania; Wariiingtoii dlsd at Mount Vernon ; We are living- in thenineteenth century of the GhrisUan #»; Columbus discovered America A. p.' U^i Sh^ike^ieare was a <kamatlc author; Sophocles wrote .^EdepusTyrftmius; N>iWtoodiscd98red1k»univtr^ sal law of gravitMion. '

OBAPTEPXL 4

Having treated of hom'onical propositions, we h<^, iVHh par^al suc- cess, we come now to speak of the second class, whf^ ^e have cidied hetar- cal propositions. And heterical propositions affirm results, whieh are directly, the opposite of those affirmed by homonieal ones, and eonsequeMfy the two classes are diffierentii^; 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^ h«mon)^aid another p^son reply that A is net B, i. e., that A and be are hetera,^elatltf ihakes and aiffirmation contradictory oi the affirmation c^ the foritier and

vice Versa. ' ' " Digitized by ^OOQ It '-^

Now if we take two twenty dollar golil pieeep whidi aw Intet se

similia, and lay tliem before us, any person will say this piece is not that one.

But the two pieces being inter se similia, if you hand one of them to a person, and then take it again and put the two toejether, 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 proposition, 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 diflFerence between These two pieces are separate existences, and This piece is not that one; leaving the wording out of the cdnsideration ? The diflerence 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 preposition 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 existence and the whele 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 heiera, this and that, before their subjects: two homonical propositions may also be condensed int© One similical or commensural one; or they may be differentiated or incommensurated, in differential or incommensural propositions, as we shall sec hereafter. But there must be an heteration of existences in the mind before any proposition whatever can be expressed ; for we have already shewn that the process of heteration lies at the very foundation of knowledge. And this process of heteration 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 affirmation. This has been overlooked, heretofore, by all writers upon logic. 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 predicate was denied of the subject; a proposition, which follows legitimatel}'-enough from an other, which is that when this particle is omitted, something is affirmed of the subject, but boih 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, similical or differential relation to the ego in an homonical time; for it it could, we could have no knowledge of identity. When we lay, therelore, 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 tlie 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,J;he subject and predicate subjectively have the same where, but not an homonical time: Jolm 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 slmilia 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. "^'^'^'^^ by V^OOgie

Now we have, heretofore, divided subjects and predicates into two

classes, simple and aggrtgate. 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 saj that this apple is not that one, we apparently compart 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 wberes and affirm hetera, and this is shown by the words this and that. And if the reader will'bear in mind, that wheneyer he can heterate the wheres of existences at the same time, or subjectively heterate the times of subjecive existences, the proposition may be heterical, we think he will be able to detect heterical propositions, whenever he may find them in books or conver sation, by some words which distinguish hetera.

We will set down a few heterical propositions for practice: Philadelphia 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 heterating their times, but when projected onto the ground of the non-ego, the beteration of their times does not distinguish them and as I can not heterate their wheres at the same time, I can net distinguish them at all, but pronounce them to be homon.

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

existences but can distinguish them'no further, the'existences are objectively simillа. 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., ttite '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 heterated, and therefore, objectivelyjtlie 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 PROPOSITIOITS.

We proceed now to the consideration of the fourth class of propositions, namely, differential propositions. And when two subjective existcnce.s 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 elemeBtary 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 spen to be a differential proposition. The sign NdT 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 theterms are particular names, the names of individual existences, and that the distinguishing heteri-

beterrcal names, this aod that are Joined with the eommen names, kbd aai eaKEN, and thus making red and greeu the names of partieuiar individuats: "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 wiien we say this red, or this or that green we mean an i^dividnal. And hence in heteri^&l propesitions, the terms are mdividnal names, whhU in differential propo«hion!<, they art «oHmite<i cotnraon numet. And we- may assert with truth that all r«d is not orkbn: thoni^ this preposition, fVom the castom of onr way of st>eaking, seems to impiy that s«)me rsd is green, and to avoid the effeotis of language npon 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 blaek, i. ev, one of thegregarla sineq-na non of man is not hlack, i. e., Mack and each of tl»e gregarhieine qua noii of man are differentia, and therefore, by implicatiou wo alllrm that some men sre, or may, l»e black. An4 hence the custom of language, when we say that ail 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 existsnces, if the terms at« unUmite<t common nomes, theproi^oftid^n isdi^rential, 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 nggregafe existences, as a man Is not a horse, Is a difi^rential {>roposition ; TiiTs man Is not that dog, heterical. When, however, the subject is an aggreffate 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^flcreotia. 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 gregarlum 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 onr of tka horses is gray, i. e., gray and the color ot 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 negm; an apple is not a pt*ach ; no fish is a bird ; a gosling is not a chicken ; gunpowder is not saltpeter; steam is not ^'ater; none of llie pupils are learned; a true chrislian is not vicious; cotton is not wool;

iron is not exploaive; d^y is nol ol^hi; cause is aot effect ; no horde is a stone ;
tlie minbow is not a clou4; no color is a sound; the rocks are not trees. tS^c.

CHAPITER XIV.

COM MENSURAL PROPOSJTIOSS^

Having treated of the first four classes of proposiUons, we coi^ now fo commcnaural pro^^osiiions. It must be evident to any a»a t)^^ if we take two simple existences wbic^t are inter se difierentia, white and griNin for instance, we can not trutUfmly say that they are in any r^'spect ^related to each oiher^ excepi as colors; indirectly, as colors, they ar^ similia, hut directly, they are inter se dtffereotia. Between Iwo sucii existences, thm-iefore, no coniparison can b&madeUy which a result other, than ain het^rical or difi'eremial r»ne can be attained. They are m*t sifniliaand tlteretore we can not by their comparison obtain a similioal result; nor. from ttieir oomparisAn can we obtain homon. After having obtained therefore, the; results, homon, liiete^a, similta and dilteremia, in oider to obtain propositions, which will render results different from those just nwntioni4, we must measure later se results aUfedy obtained. But homon can not be measured, for it is an idenllcHl thing, and a thing to be measured must be measured by some other thing. But hetera, as hetera, can not be measui*ed, for in measurement there must be Home coincidence ami not mere separation^ and differentia, as diffyenti^ can not be measured, A>r they can have nothing in common which is measurable.

Btmilia, 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 that red are cominensural, and if we compare one stick with another we ctM) say that this stick \» as long as. that one 1. 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 div not deem, it necessary to enlarge npon the subject ot commensural proposdtions, as we concluded that they will be easily under it<i<Kl, and they will also be illustrated along with the others iiereafter. We*nrusthere observe, hotv 'ver, that homon is at the bottom cf them. When we sa^s this red is as red as that reil, tlie as iucd and T»AT red are homon, ami by stating two homonicai propositions with the word AS between them, we will readily see, hoiv two hommiical prop<>siiions merge into one c(mimcnsurai> one; Thus, this red is red, as, that red is red. In the first pro|>osition, the subject and predicate are objeclioualy hoiiion, and so also with the second proposition, and the word as sliows that the two are commensural. We will subjoin a few examples for practice: The day wNs as dnrk asntsrht; this candle tthinesas bright as that one; she looks as fresh Jis the rose; it W just as sweet as hom*y. x+^^^z. , ^^^.^

CHAPTER XV.

INCOXtMEKSCIlAL rUOPOSIJIOJJS, ,

We come now to the coDsiderulioo of, iaoo«ai)»eD8tirftbte proposUkms, the \t»i clasA of logical propogition^. And in inoomiBcntunil propositions, til* «xiftle»ot8 «Miipared are simiUa in kind^ bat they diifeff ia degree or qatDtiljr. Ufiea wetaj that this eandle sKiioe^ briis^ter tl^a^ thai one, ^$i mean that there m aa excess ot brigiilaess in the- (me compamd wUk the mkcr. The tiro are not diffiereoiia, as.mhite and bUek arct J^MUi thett is a diffeveiioe, an excess, in the oi»& OTer aad above tiie brightness which exisia intiie Other. Tlie dilierMpce in the specific gravity of Uodiiira is exfr<^Med ia incom mensural propoatlions, as noId ia heavier tiiaa iron^ U e., .the ttpeciiic gravity" of gold and that of iroa are looommensiiral. Tkm eKceas luwn^ of the existences compared is some tiaies shnwa by the use of an atU^/clive nanie i IV the comparative degree; There are, hoainver, three wa^s^of expressiAg the excess ia words, viz., A is larger lh|ui B, B is les4 than. A, atd B is not so large, or not as large as A.

Now id^en we say that rrow is while L «., one of .th« (acial gregari* of snow and white are nomon, we locate the gregarium, whi4« aaiuag the other gregaria, w4iich nAake up snow, so witen ii^asay thatiee Is-colder than water^ we locate the exUtencc, which would «e wimed by the adjeotive nt^qoe ia the positive degree in ilie suh^ev iee, and b^' adding KB or uivm Ao.tki^i Adjective name, and thus- marking an eaces^, we locate also the oxcesB in the subject. Tidce^lrst tJie^ease «>t tiie oc>mpafisoo< ci4F simple existjonces, this red is reder
than that red. -Now Iraring lai off of the adjective name i|nd we will have BEFOKB THEHftliis^ed fs fed, an homonical propoaiiioo. And in. the pr<^>-sitioallUH ^d is reder than that red, we retain tliehoiiMUiical red^^the predi-cate of the honifonical f^roposition, and add, km to its aanie to snow an ejs/pess above die red wJiicb (oltows after than, and which is ihe predicate of the in-coromensural pn>p<»silioM. But as the predicate of the hoai<mical proposition, was located objcctivtly in the subject of the proposition, i.e., it and lae subj»*ci
were found to be homon, so the exces$% added to it in the incommensural pro • poflition must be located with it In the subject of the incommensural propo-sition.

In l,\\e incommen^ttr^ proixisitioo, thjsml is less, red than that red,)M)wpi'er, tbe (lecrv^ienl is located in the ^Mbj< ci aiul consequently the excess IS in the predicate. And in the propositior^, this u-d is uot so red as ilmt red, the FO.KM) aiKl.inJti. nivD ate h<mon, i. e., the degrees (jf red sunjectively eowuwensujal are olJectivvlT.h<}m<Hi in the prcdiente of the incommensural prjuposition, arxd the pari iple not fc=hows that the de;f|ees in tlie sulijcct and those in the homonieal predicate are incommensural. Ii^ the commensural proposition, ibis red is as red as lh»»t red, Ihe last Iaoreds, \>hlch are h'»mo

in ihe predicate, and the subject are commensura], but if we insert not we will have; tliia red is not as red as that red, in which the last two reds are homoD, and their degrees and those of the subject are incommcnsural, the di^fterer^e^ or excess being Ia the predicaio.

Kow wlwn thesuljjeot is an aggregate eiipienoe ft«d it is compared

apparent] J with iin Aggregate exUteace io the predicate, in cmsmeiiaarfU «id ittcommeiaoral propositioosj H ia always one of the gregm-ia of each that is omii pared, and these grevanacompared Are always aimHia in kimifbtit coin tneo. sural or incommenaural indeicree. Intbeppopoaition snow ia whiter than chMlk tlie facial fpegariam, white exists in eadi of the agigregate existenees, ¥ut Ihe degrees oC wlrite in the one and in the other are compared and fr>und te be tn-coQMnetistirii. And when we say alt snow is whiter thfin chailc, it is one of llie greg%riashieqtm hm) of snow that enters into ilie idoowmenaufAl propenrition. And if we could say in trath tlMt aH snow is whiter than all or any chelk, the degrees ne plus ultra of chalk would be c«>mpared.

Defore passing on to the next chaptter, 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 seveath class of propositions, bntron exami-nation, it will (M foutKl to he merely an foomonical proposition ooUeeted into' a copclnelon from several incommensoral (Hies, and it may be thns stated, ihe strongest man ameog the n^n in llie hfonae and John are homon^ And aa also, Sampeen wae tlie strangest man m(whom we inive read, is an homonleal proposition. iFereulcs was stronger man Samps<m, iaan ineon^meneura] pro.]>osit1on. And sill propeeitioas, in which Ihere are. euperhitireaamee, are homonleal. We nvelhe following examples 4'«>r practice: Wint^'r Is colder than summer; th^ elephant is moi« Intelligent than theas»; dogs are more fHithf\i] than cats; cows are more useful than rabbits; ihe bite qf a ratlle~ snake is mote dangeroue to man than tl>eetingof ibe wasp; Honey issweeter tliansHgart the mAe of 4lie nighlen^ale is inare.pleattaaliiluin that of iba crow: 3&f.y^x.

ClfAn'EH XVI.

PUOrOSITlONS PnOMW'C'IMlI.SI.Y^

Having gone through with tlu^ 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^ntlo^ the^esulnlivi. sions. Kvery one will see for himself that any proiK»itioc of either of the forejfoing classes may be stated categoricMllr, i. e., the result be affirmed as Mctu'ally exidtins:. or a result may t)e 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|>o8lii»)ns of all ihe f<»rpgoiug classes. ^^^^ ^ o

And lookini^ baok to ihr nrminal iruihs 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 «fcc., 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 similia, a cogimon name. We may have a horse and a dog and the two arc existences. But ExisrENOB 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'erentia) 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 difierenlia.

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 distingnished by such name could have no numerioad relations to other things, except as hetera, which in lan^^uage cU>BOt 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 \vhen 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 existence, and that is sound ; but a color, as a name, not only distinscuislies 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 proposiiiona, makes them quasi similical ; as this town is a Philadelphia, 1. e., ihia town and one of the Philadelphias are homon, and in effect, this town and Philadelphia are 'similia. The proposition This tow^n is Philadelphia; is an hottionioal preposition but the placing of A before the predicate makes the proposition tttough lionionical 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 ; iveither of the terms point out a dumt^riciil relatioD; but lu the homonicul proposition J iho is a man; i. e., Joliu ami ft (one) man are bomon, tlie predicate term roints out a numerical relation, and as it stands tor tlie same object as Jolin, when John is brought among the similia of which it is one, among tliese 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 homonical proposition Ked i^ a color; ued is brought from primary propoeitional truths into nominal truths, and among nominal truths, it is one of the similia, a color, i. e., rep and a (o le) 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 miuds, otherwije than by calling 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 reiatifms, 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 proposiiion, Sjiow is while; i. e., a gregariuni of dn»w and A whit« color ai-e homon, and we see that wuite is brouarht into and t^ciculated among other gregaria in snow by an hom(mical ppo-positfon. Again, Snow if* cold, Snow will meli, <fec., are all homonical pro-positions, and the predicates of all these] roposii ions arc located, lasciculated in snow. We may say While is in snow; i. e., the where of a white and that of snow ar<^ homon. Cold is in snt)W, The cnpacial gregarium of melting is'iii 8iK)w ; all tlHMe gregaria co-exist in snow, i. e., a fasciculus of certain grega-ria and snow are homon. And if by homonical projwsitions we fasciculate simple f^xistences in an aggregate one, can we not in like manner bring together aggiegate existences? When we say. The audience was intelligent, we httve done so. John is vntclligent, H illjam is intelligen:, Mary is intelli-gent, <fcc.; 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 existance, the gregaria taken together in lasciculo 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, arc compared in ftiscicnlo. Somo of the gregaria of the one and nnme of the other may be similia; but if the one c<m»prehend certain gregaria aiul the other certain gregaria, which

are inter se diff«reiiiUa, or if the one contain gregaria over and above iUe sum o(the gregaria contained in Hie other, the two fasciculi are inter ae 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 ; belter, No stone is iron ; and this proposition is cqaiv..L*nt to
Xo iron is stoiie. And hence when fasciculi of gregaria comprehended by the subject and predicate terms, are compared, the proposition may always l)e 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, homonical ; Tliis is not that, Tliat is not this, heterical ; lied 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; ani Tiiis red is not so red as that. That red is reder than this, incommensural. But wh iu one term is tie name of an aggregate existence aud the other the name of a simple existance, it is alwa^'s 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 ascer-tain the existences, which are reall}'^ 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. Tnis may be none in all propositionsi

Now prepositions as we have heretofore said, are names of relations in space among existences: thus when we say Snow is white, we mean tlwU the color of snow is white, and snow being the name of a faeiculus gregnria, OP shows that color is located as one among the gregaria in fasoeculo dis-ting^uished by the word snow: it, thai is the preposition op, is the namegvveu 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

ihemountain is white; the affirmations are similia. But in the lalter proposition One ot 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 nama 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 tlm proposition is hrmoiiical; 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 logethor, constitute but one name to distrnguish one simple existence in every respect from otliei-s, and wliich simple existence we compare with WHITE and pronounce them to be objectively homon.

If a, b, e, d and e be tlu simple existences, the grcgaria of an aggregale existence, and A be the name of the fasciouhit'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 wiieke, which sball be distinguished from other WHERES by words we may say; A upon the table is a. And if tlie where is not yet sufficiently distinguished, and we may say, A i pon the table in the house; and still further, A upon the table in the house of John Sliles on Iront 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 fasciculalion of the subject and predicate of the proposition, This book is the property of John. We do not <M)nsider it necessary to explain the terms of propositions further: but the copula is yet to be examined.

Now in the propositions, I am; 1 exist, or I am an existence; we must see that the atfirmation is made in. the present tense, grammatically. And in the proposition, I was, Did exist, or Was an existence; tlie 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 h(»mon. Columb is discovered America, A J). 1402; may be rendered The time of the discovery of America by Ck)lumbu[illegible] and A. D 1493 ar« homon, etc. And whatever may be the tense of tho varb, the existences are always compared and the affirmation made at the preseBt time. But respecting what is called the potential mode by grammarians, as John may be a scholar; the verb itself implies japacial grejgaria ; thecapaciftl 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 refered 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 nothing. Take the proposition Tliis is nothing, i. e.. This thing and no-thing are homon. Now if the subject Tiirs thing, means some THiNO'and the predicate xothikg, 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,

sulijectively 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 gronnd of the non-ego nothing; this is nothing.

Rom. — ^Peac€, peace, Mercutio, peace; Thou talketh of nothing."

Maro. — ^True, I talk of dreams, which are the children of an idle brain, begot of nothing bat 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 distinguiah 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 XHher existence. 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 proposition, 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 ttie 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 indefinite. And hence when there are two existences or but two modes of existence, and the one is named a, for instance, not a may be used as a definite nafne 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 difl^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 tlrree 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 wonid be indefinite. But what definite existence is meant in the case, by not GREEN, would l)u indicated by the subject ot the prepositiim, RED, and hence red and tub not green are homon. And if not green and KEP l>e homon in the pro|x>siiion, UEO is not green, rru and green must be Oifierentia; for in this proposiiion, red ami not green are homon, and in the proposition, green and not red aie homon, green is, and red is; the homonical proposition, red is green, however, is not true, and the similical proposition, 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 propoaiti4>n8 be understood; yet it may h*i said that when we say snow h white and

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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 ; &uc}^ 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 propositions, which are called thQ premises, and a conclusion drawn from these preii^ises* It is also necessary that there be fpur subjectivtly Iieterical existences, 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 homonical existence, or ol tlie similical or commensural existences, whioh ara in the premises, but not in the conclusion, is called the middle term, beoause it desig^iates or distinguishes the homonical existence or the similia, or commeqsura, with whicl^, each of the existences, which appear in the conclusion Uas beep compared, and it la by means of thi^ homonical existence or similia or comiiiensura designated by this that middle term^ the comparison, between th9 other two existences isjefifected and the result get down in the conclusion,. Now it must appear upon the priaciple 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 followving.paradigm will show the figures :

1st figure. 2d figure. 3d figure.

ApsB IJisA AisB

C,isA C is A A is C

.-.Ois B i-^l«_?_ '-i^ii-^iEl^ff^^^^iL^M*^

4th figure.

& is A
Aisg

Now if we lake the first four classes of propositions these may be

combined two and t^o as premises^, and hence the #rst figure wiU give ^ix^ teen kodbs of sjllogising according to the dl^erent m^ner iz^ wjiich ,we combine these four classes of propositions and so with the other figures. The following paradigms will show the m^ner of combining the first four classes of propositions in all the figures:

FIRST FIGURE.

First mode.
A & B are homon,
C&A» " homon.
.-. C & B " eimilia.

Second mode.
A & B are hetera,
C <& A are hetera,
•*• C ^ B are hetera

Third mode,

A & Bare similia
CAAareglnilia,
AO&BlarejBlmllla.

Faarth Mode.

A & B are differentia,
C & A art differentia,
.•.C&B^* differentia,
or BimiUa.

5th.
A & B are homon,
C & A are hetera,
*• $ JS^re hel£££L

A&Bar
C&Aar

6th.
e homon,
e similia.

7th.
A & B are hdmen,
C & A are differentia.

8th.

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

9th.
A & B are hetera,
C & A are similia,
.'. C & B are similia or
differentia.

10th.

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

llth.

A & Bare similia.
C «to A are liomon,
.*. C & Baresimilia.

12th.
A «fc A are similia,
C & A are lietera,
.'. C & B are similia or
difterenlia.

18th.

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

14tb.

A & B are differentia.
«fc A are homon,
/. & B are differentia.

15ih.
A & B arc differentia,
C & A are lietcra,

.-. C & B are differentia
or similia.

16th.

A & B are' differentia,

C & A are similia,

.*. C «& A ar^ differentia.

MODES OF FIGURE SECOND.

1st.

2nd.

B & A are homon, \B & A are hetera,
V & A* '' 8imUia, t & Aavg hetera,
.*. C & B •* eimilia. • /. P. & B are hetera. .

8rd.

: 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.

6lh.
B & A are homon,
C ^ A are similia,
.'. C & B are Mmilla.

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

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 dllT.

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

lltb.
B& Aare similia.

12th.
Bi% 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 diflferentia.

.-. CA Baresiiuilia.

, ••

14tb.
B & A are differenlhi,
V> & A are hoinon,
/. 0<& Barediiferentia.

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 arii 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 siniiHa, : A it R are diifcrontia,
: A & C art* liiiiiiilia, 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 difterentia.

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 Iiomon,
.-.C&Baredilfcrentia

9th.

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

IStli.

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

15»h.

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& Barediff. or»im.

13th.

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

. . C & B are differentia.

16lh.

A& B are differentia,
A iV& C are simiilM,
.\V& B are differentia.

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MODES OP FIGUBE POtTRTH.

iBt.

B ud A Are homon,
i' and C aie homon,
.'. C and B are similia.

2d.

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

8d

A andB are similia,
A and C are similia.
.*.C& Bare similia.

4th.

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

6th.

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

m 6th.

B and A are homon,
A and C are Bimilia,
.-. C and B are similia.

7th.

B and A are homon,
A and O are diflferentia,
.*. C and Bare differentia.

8th.

6 and A are hetera,
A and C are homon,
.'. C and B are hetera.

9th.

B and A are hetera,
A and C are similia,
.'. C & B are sim. or diff.

10th.

B and A are hetera,
A and C are differe&tia.
.*. C <& B are diff. or sim.

11th.

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

12th.

B and A are similia,

A and C are hetera,

.'. C & B are sim. or diff.

IStfi.

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 th» •xisten-
ces are distinguished by their names, bat 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 net this ooe^hetera,
Therefore, the othbb one and that
one are hetera.

8d.
The color oi John's hair is like Mary's — similia,
Mary's is like James'— similia.
Therefore the colors of Jehn'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*^ilferentia.
Therefore a pear and a peach are differentia or similia.

6th.

Su^ is sweet— homon.
This bread tastes like sugar— sinniliai
Therefore the taste of thisJiread and
sweet are similia. -^"g^L

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TthT
Sugar is sweet— homon,
Vinegar is not sweet — differentia,
Therefore the tastes of sugar and of
Tinegar are differentia.

9th.
This apple is not that one— hetera,
This pear tastes like that apple— 3im.
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 a#ple is not that one — hetera,
This pear does not taste like that appl

— differentia,
Therefore the tastes of this apple aa*
of this pear are differentia or similiJ

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 o

the house— similia,
John's barn is not the barn spoken o

— hetera,

Therefore the colors of John's ban
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 syllogising with the first four kinds of propositions>i thi'^fMltJ^yS^tWsM.

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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 1 .•.C=Bor C<Bor OB

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

6th.
A ^nd B are homon
C-A
.•.C=B.

7th
A and B, are homon,
0<A, : or OA
.•.C<B i.-.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,
.•.C=B, orC<B, orOB.

13th.
A=B,

C<A, : or OA,
.•.C<B, ; .-.OB.

14th.

A>B, or A<B,
e and A arc homon,
.-.OB i .•.C<B,

15th.

A>B i or A<B,
C and A are hetera,
.•.C=B, or C<B, or OB.

16th.

A>B orA<:B,

C=A : C=A,

.•.C>B : 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 whicli 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 similical or commensural exi&- j tences. We hove, 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 distinguish 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 proposition 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 ub 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 Ist and 2d are commensura^ or lst=A, 2>» A, if it be so and therefore 2d^ Ist 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-busUel ; no one could put into a pile one cord of wood ; and no one could tell without first having knocked his hat ofl, 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 fro.n 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 u;ed 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 th« 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 tlie circumstance that the friends of logic have been neither able to explain this process, nor to refute the objections of its advisaries.

For the explaination of the syllogism, most of the writers upon logic have relied upon the Aristotlean dictum de omne et nuUo— 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 proprosiiion, 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 hare before us several marbles, the colors of which are inter se similia, we may with equal truth, turn the dictum ths other way, and say that whatever can be predicated of the color ot 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 tha middle term must be be distributed in one of the premises, i. e., stand for a whole class of individuals eo nomine et innumero; while in truth it is never does so stand, but always represents an homonical

iDdiTidual, 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 conceeded to its adversaries, that in everyr legitimate syllogism, the conclusion contains nothing which is not emplyed 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 Socratee, 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 tor the syllogism to prove ? That in sliort, 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 conceeded to be so, that there is nothing contained in the conclusion, which is not implyed 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 implyed 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 traisposed (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.

\> e will commence our examination, therefore, with mode 1st in the paradigms in which the first four kinds ©f 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 Deen differentiated from the other four nominal truths into color ; but inter se they could not be difl'erentiated, 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 net; and why not? Simply for the reason that their times can be heterated, and the power of oTir 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 subjeclively the same existance 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 fai'ther we must say, this and that are similia, and merge the two homonical propositions into one similical 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; aad. 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 hetereical existences of the premises merely subjectively, they would not bring us into a conclusion ; but two of the subjective existances 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 at an homonical time; but 1st and 3d, cannet 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 distioguishing 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 nol 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 difierentia, we see from the terms that soub and BITTER are difierentia, 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 differemtia, which indeed is true, but it is not therefore true, it docs not follow from the premises. No categorical conclusion can he 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 difimissing from our mind those differential names, we say, 1st and a pear are differentia, 2d, and a pear are differentia, and as we do BOW see from the terms Ist and 2d whether they be differentia or not, the conclusion follows ligitimately in our minds from the promises, and w« 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 httera, 1. e., snow has a color and paper has a color and the two colors are hetera.

The sixth and elerenth 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, fellows from the premises, though this conclusion is an homonical proposition. The taste of this apple and sweet are homon, the taste of this apple and that of that pear are similia, therefore the swebt in the apple an^ the taste in the pear are similia; but similia hare a common name, and therefore the taste in the pear when named, ie 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, (hat in the premises there are subjectively four heterical existences, to-wit; 1st, The taste of this apple ; 2nd, Sweet ; 3d, The taste of this apple ; and 4th, The taste of that pear; three ot which subjective existences are objectively homon. The taste of that pear only, is located in an heterical where with reference to the where occupied by *'The taste of this apple, sweet, and the taste of this, apple;" the other three heterical existenecs of the premises subjectively; but. objectly these three are homon. But the sweet mentioned in the conclusion is not objective!}' homonical 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 objecive existences in the premises, which are inter se similia, and in the conclusion, one of these similia appears loeated 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 homoo, 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. A.nd we must see hat 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 homonical 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 8wee{ 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 geusral 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 Ist, for the reason, that we desired to get the reader further along in the knowledge ol 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 implyed 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 lame, 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 co what we have called nominal truths, where we saw that when an object of vision arose into conciousness 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 trmths ef the ether senses. Then suppose green to have arisen into consciousness, green too would have been called eolor, to distinguisn it from

objects of the other senses, and then red and green, as color, as distinecuished 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 conscions 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 similib 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 l>e 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 distinscish 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, 1. e., one of the dots of any A and a are homon. But B, this particular stick, which I now hold in my hand and mention 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 wc 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 Ist 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 similical, and the conclusion trom the homonical premises that the gregarium mortality located in the 1st object has a simile in the seeond 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 mortal, 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 respeet in the object called Socrates, since he is a man — Socrates is mortal.

The reason that 83'llogism, 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 WHBBB, 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 hoiuse Imd 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 bethe name of a statue or of a fictitious god like Jupeter. In the syllogism, all men are mortal, Socrates is a man, and therefore Socrates is mortal, however, both premises us they are usually unnerstood, 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 premises 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 siMrLE— 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 — diflerentia ; Therefore the tastes of sugar and vinegar are difierentia. 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 explainations. 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 distinguish 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 ot propositions they commence to syllogize and to construct rules for obtaining 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 tliree propositions:* in this we are agreed.

The third rule which tliey 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 unirersal 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 falsly 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 homonical propositions and that the predicates ef each — a color — are objectively two and not one and the same existence, they are not homon, and thac 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 coiiOB, 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 homon, 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 constructioa 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 homon, 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 fallows legitimately, is that each bird and the animals homonical or similical with the animals inaluded in the predicate^c^fSi&ffSA^nical pro-

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position "all quadrupeds are animals" are differentia. For bird and animal are brought into the comparison in the conclusion by means of an homonioal 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 simiUa or commensura.

And in the obove premises quadruped is compared with one animal, and quadrupeds being inter se similia, bird is then compared with ont of these similia, and the conclusion must be that the animal compared in the homonical proposition and found to be one of the quadrupeds and every bird must be diffirentia, but nothing can be infered respecting any other animal, except it be a simile, than the animal spoken of in the first premise, which was homonical 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 hemonical with RED and green are diflerentia. 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 ean 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 sucn 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 piemise be n«gatiye the concltt-sion must be negative. This rule in our system means nothing.

Now in stating every homonical proposition, such as All men are mor. tal, we must be careful to see whither the predicate be one of the gregarift 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 grega^ ria, are the names of existences standing as a class by them*elves. When we say "All gold is precious," we mean that all gold and one of the things esteemed of value amonjf men, are homon ; the proposition therefore should be stated this; All gold is a precious tking, and then we can add that All gold is a mineral, and it will follow that the mineral homonical 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."

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(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 |)henomeua homonical with colors and sounds are differentia. We have gone far enougli 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 unimous 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 aid find the lengths of ihe stick and table so be commensura, and then apply

the rtick to another table and find the stick to be lonscer than it, and we should then make the following Gtatement; lsttable=stick, 2d table<stick, therefore 1st table>2d table, this would not according to the receiv<!d doctrine be a legitimate syllogism. But if this be not a legitimate syllogism, what is ii? General propositions are necessary at all to enable us to syllogise, excepting when we wish to syllogise with gregaria or a gregarium sine qua nou 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 difterentia. In such cases as these, general propositions are necessary; but such cases 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 realy 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 con'^ary, (where not a mere inference from testimony) 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 heighth of a stove in this room is cornmensural with the heighth of a stove in the other room, which latter stove the friend has never seen, and that,the heighth of this stove is three feet, and then ask him from these data to tell us the heighth of the stove in the other -room, if he does not aylUgise and on the syllogistic process make an inference, I>hould like to know in what other manner, by whatltind of induction, -lie would be able to solve the iiroblem. Digitized by ^OOgLC

chapter; XIX.

EXPLANATION OP STLLOGISH CJONTINUKD.

Having explained the syllogism, in which the first four classes df 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 prepositions. And of the manner, in which the first and second classes of propositions are combined in the syllogism, we have already said sufl9cleiit; it is to the manner of combining commensural and incommenanral propositions, therefore, that we will more especially direct the attention of the reader. In our explanation of propositions heretofore, we observed that, ^imillbal and differential propositions spring from homonical propositions; we showed this to be the case also with commensural and incommensural propoisitions. Homon is at the bottom of all propositions ; hetera ar6 at the bottom of all knowledge; and the power of the mind t« heteratb depends upon time and space. We must also perceive that, homonical propositions, which are collected into heterical, similical, dififerential, 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 ot existence; and after this has been oUtainecl, we may say indeed, that this grounded in the egoaUd one existence grounded in the ego are homon ; but when the one isxistencb 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 bringfng them ihto aq ho-

monical where at an homonical 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 where at an homonical time they do not become homou. i^Q<I where we say. This is an existence, and then again, That Is an existeticeV tlie first existance and the second one are hetera, and if they can not be discrim^* nated furtheip they are similia. Existences, however, is a hamej whicti does not distinguish existences inter se. But if we say, This is white, and then again, That is white, as white is a name, wbich distinguishes existences Inter se, if the first thing and the second thing be not similia, in the respect of color the word, white has been misapplied to one or both of them.

Now in commeijsural and in in common sural propositions, the things conapared are always similia, yet commensural and incomraensural propositions are not 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^ fj-ofl p;ne -ar? .^oii^on, if4Ue leagUis.nof the two sticks be npt.cojc^jt^pnsuf.^,* ON* h^ no. definite', meaning; and weican give a definite m^ajiiog l^^ "liiE <july by lukingsame h^monical Uiing as the unit of naeasiireipeiat. If then wftniakc tUe-lengtb of a particular! *stick the homonical thing by which to (Icfiut; o.n k, and appJy tl^is length to another stick, and we qi^n not diacrlmJnati; Ujc leu^jlhs of tho two, we .may say, the length of the fliaf ^ti^k, the homonicul tliiqg wjiich- w,e^ hi^v« made .the unit of measurement, and i,mK aa-e homori, aad. as the length j(jf thp second stick when comp,(3^'req with the flisl tii^miut be d,ispri,miuated from, it, we rauat iVom a mental
necegsit^caU it Qiffljj^Ucj. Tlje Iqngtl^ ot the first stick and one are homon, th&lenjjth of ^^rsl stick: and th^tof .the second are A^ommensm*a, therefore the lengti* of af^coud.jsiick nud one ar,e commei|;&ura; but oommensura* must oi iiec^sgity hay e a com 1110:1 na live,, and henqe.^he lej^^^h of<seeofid stick must t>e C!i||c4 ONE, liud Wd^4J3 iff s^pnd stick whpn n^»l, compared with another, and o:^ii^ me hpmoD, Aiivi if i^^ecpmbi^pithis. proposition, with the h^monicpT oije, which guyci Uiti ^uU of measuvpjnept, we wiU hayje. length of first siick an J on is are hom^n, length of 8ibC(>n^ stick and one are homon^ therefore lengths c^r fir^l aqd .jjecondistic^s^.^rje commensur<a, since one and one (not twice oiie) ai"c coiftmciiii^ura, tel ; 4p4Jbt^pce the length of any stick whicii may bt aiUp'^i one, will pe commefjsiaral.fyith the first atick. If howe 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 , aye jnter; se^ incoiparaensura^ and we may contin lie, ^ysurijfia, 3d <4ih^ Lheref ore 1.8t<4itii,. bnj 4tl^<5|,h, tl^er^fore lst<5th,
biit t5tb<;6Ui, tK^rjepirc i^KOU^^-apa thepefo^e 1st or.^^J^^p^0ro€ tjhe objects af^^r lat,,j^ less lU an g^i, *.ntl 50 /on, IJere. tiien we Iiavi3 -i^uc objects inter se
incommtinijuia, tjad a^ ihey aye sim^ilia i.n k^pd, each of them in; a like manner, hf^ been difiTti-qiitfateu ft'om othei\ things, and ^hey la^ave a>coffvmon name
dis^inj^uish^ng^ tlicm trov^ uLher thing&jU^i kind; but this namt^does not disliogniEh^ them inter, ai:* ,.And if we i?anae theni l^t^ 2^, jSd, <fcQ., t^ese diatio-
^mshin^ terms merely tl[sUpgui^|i tljem Jiejt^ricaHy int^r se, but thpy do oot show the iacommensuiai it^latiaAS-e^i^ttin^, among Ihepv, .^nd therefore by ibe u^e^uf' ai^ch tei;Eny». we can i^ot^ sho;iv,;afty results furtl^firrthan

heterical,
which M^e may hare obi^intd. l^y coDtiparing tho^e objecjis /iQ^evse. There is jbjijetpre, oaly on^ possible Wiyr fyr.\^ t(x foTO a language by wh#3e terms, w^pa:>j'l^? P^IjIc to &how U»<^: resuits of the minds coippf^risdns an^oiig cem-nieu»ura] and inccimmtngnraJ objects. A^ter that wej^ave gained, thtsi knowl' ^d(re of the i^ojijunical thini^, which we esUblish, as the unit of measurement

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in an homonlcal proposition, we niay apply this homonical unit to a second ebject, 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 resnlt of the comparison between any object named two, and tlxe 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 incom-raensura 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 \he 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 syllo-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 cas«i in mathematics, and as geometry affords us sufficient illustra-tion of our subject, we will confine our remarlcs 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 betw6e^ 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^ngle. And it must be observed that line is a C(»mmon name for siml-

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lia and that STifAiGHT line is also a commoD name for similia, line being a

genus of which straight line is a species; and so also with angles &c.
But alter the definitions in geometry, then tollow what are called axioms. Tlic^e bixioms are contained in commensural and in incommensural prnpositiona, ihe bottom of which, as we have seen, is homon. But the com-tnensural nnd incommensural propositions which contain axioms are founded raore JmBiediaiely upon the syllogism. The axiom, that Things inter se almilin, which fire tqual to the same thing are equal to each other; is obvi-ously ihe coadenssitlon of a syllo^';ism i^nto a commeasural preposition. Let the length o! a cermln stick be the homonical unit of measurement and call this length due; o:ne then will be a common name lor all lengths commen-isnraJ with tlNU of Ui^s stick. Now if we apply this stick to another, which w.^'will call A, and they be tound to be coiiimensura, we will say, A and 1 are commensura, A=l ; and if then we apply the first stick to a third one which we willcall i6, and find them to be commensura, we will say, B and 1 are commensura, B=l; then we have the syllogism A=l, B=l, therefore A=:B.
And all the axioms of geometry are founded immediately upon the syllo-cVitic process, though homon is at the bottom of the whole thing. If equals be acltled to equals, the sums will be equal, is very pUinly founded on the i^yllogisiii. . If A=B, as they are commensura, we may call each of them—three!; and is A'=B', as they are commensura, we may call each of them—ty'd; then jf. we apply the homonieal unit of measurement to A, we find that thrice oiiti' and A are commensura and so also of B; and if we apply the unit to A', wi; find that twice one and A' are commensura and;s« also with fi' ; t)ien*A.-rA' must be equal to five times one, or five, and B+B'= five times o[i(?, or rive; and 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 Qtlier coincide, throughout their whole extent, are equal, this axiom ii fouhded upon the syllogisni: and in this casp we come 'closer to the homou attbe bottom. Suppose we have before us a certain object called A, and an-other called B ; it' now we represent the magnitude of A by A, and that of B by D, wc? must tiien say, the magnitude of A and a are.homon, and the mag' hitude of B and ti are homon ; but it a and b cannot be discriminated other-wise than heterically, if they coincide, they are commensura, a=b, and each flf theni miiv be culled 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, ire would have m. of A and a are homon, m. of B and b are homon : but a<b therefore m. nf A. and a are homon, a<b, therefore m. of A<b; but m. of B antl b m-fl lionmii, ni. of A,<b, therefore m. of A<m. of B, which is th«t«un-dati«ia nf the axiom, that The whole is greater than any of its parts. For, Ictonjof the whole lie represented by a, and the m. of any part be represented jbjftB;^ tk«n mv of the whole and a are homon, m of part and b are homon, but b<a, therefore etc.

aftklTQre^jinjaJflaBii ajad^ |)ercieit0s:thi0CVii«k»l»(^dM(»(|iYy^lUtl(iitf M mach difficnU^fiihoOffbto ti*aDe «hfo x^diarftb i3t'pit4o^mi tmhimdPk^my diffitiilt. i:l%ier0>(Ai^4KmeTers sM(i6^4lti0^«lettieatttt^ 4i^ft^Wq^i»teMFy, itti^aarded Mi^axioais, wbleh teefti^«iU;JftfM/i|^ be^TWcnniflas &]l(IXft4^i(ive been

diinerg»jV '«1I^d«tDai|;>^(:Hii«eoiiaii<»tiii«U)se laifMbe^,?' <<t4^y«MgMlriafyifk-tersecting each other canudtboiki •f:4bem be |>arAU«l t()»rUlM'^tl<al||lt^)lM^," and 3o ou ; Such propositions, however are founded upon the syllogism.
Take the proposition, Two straight lines having two points in common cannot afterwards diverge, or what is equivalent, Two stral'ght^ines having two points in common ihust coincide throughout their whole extent. Now a mere

glance. at the proposition will shdw us that ^t^is grammatiomy in the potential mode. And it must be evident tt^at t^ere are differentia^^^ourses, i. e., that a straight cotirs&^uid a QmH)ked-Qh4 - aro diflfopentia, - tmd tbat two lines one of Which runs a straight course and the other a crooked ohe, are in capacity . differentia ; ,fi\X€a a c$ir^|n nutnbpr of. poip^is ifiji^e^^^i^jhat can run' through all of "tl^e ppints, and. ,a line, .; tha(«^ft f.\^B^ ^jij^qflHh, q^br:4(|9^4f f
t^eip, are mter, se diffierenUa. ; ,, ...^,^. , . . ^..j <r,,>;:u.« - ,'r>».:i imii

• lii /j'.i .A.

•:jf>::.. : .^-
.J \\i. '.o ;*:. c

%et,*tii^^:^brp,'.^ p 0, be a str.al^t. y^f .^4,JieI Ag^fii^Bl 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^j&ef',h<[^[|£l», or similia, ABC and A B D will be similia. But the c'l re urn stance ihut tKti l>y^ut at l> in b can be diacriminated from anj^ pomt io the^ course a, atiii that at A, and)^, a and b coirifcidbi'ite^feftMttWf cOmaes A and b are dMjreutla. Thaii tire cupitciLy of 1h«llne'-A'J»%i^rffifd^A*are Iioiuon, arid the'capr*city of ide line A B D Xnd b aPi^lWllU)tiiA4)dijk:'feha B are dififeieotfi^- therefore we bay^,^ capacity of liiift A.
B'0ftM iJl»fr«i>lf*«Eott*,'k^ant! b are difTerentia, lht*rernre/enpACity of liae ,A B
OkBd'':i»^M4^d)fM>edti]¥; but' capacity of J iuc A'Bi> and b tire bpm<m. cap'acfty ef liri*»Afl(J'*nd B'ttt^'difleretitlas tbcrefee'^ABit'faihb ABD arfeWirfJ/eoliii; A
BG!h>()»W5ivei^,*by hy^^rtttiesis, Is a straight iitio/thferefore A B D ia dot'i

tlif:iw8«f U»4w4wW^ thepi^pioaUioiii tliftt two stnaghtr tiast caniistineliMe .*f«IM5^J|i>r^ftW»Qfti»ctep^ii»;* «j^ sttirrwiDdod by comecaUTe points^ imAiV ir/iitay<d9ir4>oii#«M:AightfliiOQi'ftaoUkdr strai^kt Uaa toaokingthe ftrs^ fWe4niWJtitK« pg*»to»>W{fn^ ^Y^rg^U^m it^but mUftoalncide wHb Iftia its ;lR^^.ApiMr^4Mbilk <^1irAeii»^«r9rat|AforM4ii:«etioa.c«iiaiioloM noting.
.; u r/jifO/b*T9,«P«Hw!wplwp%fir,W»WgbwAo»Ji<wlhftttb^
jlpl^|^>lyreJfiRa|u}^.^9Q«(^k«|lJllogi9^^^ Aa<iti«mug the axioms tharefiMre, we iWW/SlTyi:Oi^ jyUiis^^oa <9f tbe jwiAciiOts of Qur ^ysteovof raaapoing itom a fiqiffta pr^podUiiHi t^ geoin^jr. . Take jbh« profK)aitio& ^lat lUe sum of diQ aiy^i^ Qf 4]M*M#glQ.«re eq?ial tf».tWQ i;ljirla a^^

- ' ^ Lit D E be thto Itiangle add prbloni: the side DIMo i.; and from the peiMS draw SB pkralllei tb tic, then tVbm t)revioil8 i/Jloglsmfl we know that the angles 0D£ aid BEAare commensura; We aUo that the angles 0£B 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 aojsles that caa be formed at a given point on one side of a atndght line and two right angles are commensura, the angles A» B and C are HM^iOttkOf ihl^aaglet b6 tot^itd at the point E, cherefore A, Band C together, kntt t^ Hghl^ahgM itf« cdMmehsiira.

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OfiAFTER XX.

^^KtHYICKHB, SOBITBS AND DELj^SMKA.

. ' ,^ £(ayinj^ expli^ned, W ;tha.preyioas chapters ^he. op^ioofiii^ whipk the s/|lo|i^ic process pf^Q^'e(^.^f (}o)^^ 4een^ J^,j^i|i|aary;.tioi elfibpr^ mach - — **^-j EAtymtm§v8<^rjit^s Of jPpJj^mipja. Wkeu eitkej- ,<wie o(.ti^A.ppwlMs

^V^*^^^^®?^^^??'*?^^^ thp,plfU^rVi«i*sr#tooa,/thfl 9XiMressii4 ftrwalie

y%W ^^f 99,^^^y^'h^^ '^ ^W^hfR f^^^JW^^i ^ ^^9^ VUI ,ir*Mt« t^efjflre the /^'^iJRM%fT.^y ^*V^i9f ?ifc? i^l^8^^.A9 iroi^.«Mi4h^r^or^ it wijl; rpst* lo sdj^H^ca^^ai^fs fasj^Jtostf'pply^the premise, which la, jUAderstood* ^ Anx per-

son, well grcmttded in the ppioGiples of (he syllogbm, witl faftve At) difflctilty in tnatiaf log the eothymeme. '

Now when a coaclasion has been iegitimately drawn from premises, tbi» e<HiGlasl((Mi may be mads a premise and combined with either of the for-ttor-i^rciaisos, and another oondnsion may then be drawn; and then this Tat-ter coiiclasion may beeomblned as a premise with the first knd so on. WhOQ weoonHnne tosyllogiee in this manner, the chain Of syllog^isms is c«M«d a 8«^rHes; as, A and B are similia, B and are sim^tia, therefbre A and Oiffe^Flmftia; but and D are similia, tberefore A and D are sfmilia; but D and B are simifia, et6j And this process may be pnrsned 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 dffterentia, therefbre A and O are differentia; but € and D are similia, therefore A and D are diflfer^ntia; but D and £ are differentia, therefore A and E are differentia x>t similia etc. Now we stated in a previous chapter 'that there are flye objective' nonrinal tniths, 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 theretbre 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,

distinguishad inter se by the names clear and cloudy; one of these states new exists, therefore it is either clear or cloudy, i. e., the present state of the atmosphere and either clear or cloudy are hemon. And when we say that^Men are either black or white or ta^ny ; this is a conclusional preposition drawn in the same manner as the one above: though there might be men of nehher of tnese complexions, for aught we know. And in the conclusional propositioff Just given, that which is really afl9rmed is that one of the facial gregaria of every man and one of the three colors namely, black, white or taw«y, are similia And as shnilia hlkve tiie sarme name^ the color of any man and blaek oi; white or tawny are homoh: Again ; Iron ' lAnd glass' are hetera, helera are divided into two classes, namely, slmiHa aiid* dlffer^tia, therefore- Iron kind glass are either similia or differentiae.

New%y the combination of dislunctive conclusional tiropb^ititfifs' In p ii e iia<D ,^we forto the basis of what is called the 'f>i<f^hima; thus. A' kitd either B erCire similia, i. e., A and onet)f the two are similia, btit efthePB or.CI, i. •., either tme ofthetn,and Dare similia, therefore Aland I> ire similia, therefore A and Dare similia. And it muk benbtic^ tliat'tbi^t'eU 8n«mbiguity in the use of the correllatives, BlTHBtt, 6b. In the first4niftkti

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A^^ t\X\fAT ^or QjBLV^simiUs^ we mean tUat^ aud^onfejof jUii#iw9,#t)e simi lia, while A and the other may be differentia forA^^r^iti^ i^^i^olosed hf .i)M prQjppa^tioa; ^ri^ile in tb^e i£U.ter: lo^taace, 0iU^er, B*or C a^^ J^«r^a|Oiilia, ^
jpfift|ijtt^tjB^a(i .D ajre aip(iilia,^i»c} ajlap tJ^^^G ao4 D -afAflimma^ .AocJ-il t^is ,^bijgji^iiy, m ,1^^4:196 x)f„tb.e cpri-ellatiyes, , tUatiin^li^l .U^euiil^awtt^JiMic
of y>p bj vf}x\^h. ^veu are Ga»«iit belong; iljey i^re- aware o(,H.

, ,.;J^o«^Jf ,w^fte?.^o,YTii b^f^ u? lbe,pi"<ipoaiU/pw, A.«««<l^wib#rJBora l^e JhQjqaqn, l^^t eitj^ ^qrC jaud.P a^^e ^!CW^QPH'^lJ4*§^c|^Keful#«UQ l»»iiH J^, W the aofj,^i^piiiy; pt the oprreiMativj^s, we ^^ipj^^ily ««^ J^j iQt«»idf»ing ^^i^ propi9fliUca^ft^ojy, ^jC Q9j»e i>x .^^uch l^ppthe^iqai jey^byq^opp ! a* tlie ^qUpjw.iiyc; W A.W^-P 8^'?^ ^l^fnon^ ,A Ap4,D,4re«iflayia^ ^»d,1f jA-jand Care hoB^9fj, A /^n4 PiJ^^.^ii^Uia; |jttVA,aud>B,.pf Q are;bpm-9fti t}ieB%foi-e:A<*|id 5) a^e^lmyja,; («:^9dp,l$tj.. ^u^ ^lting,agai^i;^^etw9 djl^wc|ij<re Rmn»wtiops A^d |^t)ier ^Bpr^P^f ,t^oa^,i^nd p apd (RU|ieirMoA'.jy*r4^^9a>«»;H^wiitak-iog tjiec9ffjell^Uye<i,Jfi Ji)otb.iw^i?Mfy» tap^e^a jpft^^f M^* tiwii ;an4 iwt.Uie oV^pj;, ^e vU^lJiave JCorjCOftflysioh |,ba^ Aand D arejei/Jiersiwiliiawdk^wwi-l^a. . If 4- jBoxdB ^e JfLompQ, a^d X>, and B aie hou^on^A aad D wiH be sknl-iiaVa^d ii A and,.C)ar^, komon, aAt^ 1) ,an^, C ^re. h^ps^ A* ^94, J)/ will be ^imijia; bu^, if A ajid C,are,}i<]^of^ ^4 ^ ^''^ B >r4^ litan^cm or A apd 3 -are i^omi^ au(i D ^d C ajre hjoijajan, A;,aod D m^y, be ^iffe^eptia. Again^ if w« iak^ th§. p^©poaU.i>o^ 4aiid eiijtier^^or p ar^;wmi\ja;]^,hq4 nftiiber B,ftor C ^f5jei^ii|fi,.it wUl^Jiow.tha^iAaftdl^arci^i^ ' . , .

i^qw if i$ e^ideot ^*^*^.?y^,P^fy. M^®. ^^J <:ja^eg^ical,:Pi*oposiMioo/aad put jftto a bypothe^iqai jforw, ; Takp the proposition, Jce ia qold, ao«l w may s^y, tf i^e^iij.cold; })|at from this. i^t;erexpreasjw)Ur, ,w* expect aome CQii«pATOon
p follo^, a,^^^ we. ^t^f^ \i\p propoaiti^oi iu tbia byp/Qtb^tici^l maauer, tor the ItH^^P^ 9f ^fawiog^(^9 coi^clu^qa, , at^ therafpra we giFe U. Ma illative wor^jDji. , , Aac^ip 8uq|i.9Mes we alwaya ta^Lc ofte of tl\9 pqenjisea oda ayUo-gipja ,^nd, ^i^t^ it hypothetjcf^Uy. Take the syljlogi^ip, v^^aii^y weaiiwr-Wiwet we^l^i;^ it is raipy wciatl^ei', tb^ref<^^ it is wet wf*tbor j . ttow

iw,.may,,i«tatc
tbe sejpon^ |>femise hy^9jaie^icaily^tff if .^s r^iny weaUier, aa4 ^rawith^-eon-
cluaic^^Iti? wet w^fi^r, leaving.)i^e,flr8tpremi^ .^^ Wq «all

BUCh ^^u^lent8 |iypptlxati9«ji . eij^y^i^f fpes; j , ^^ ^\himt. exprfs^WPoa. pf
mgiir
^ii^t, yifi^i<^,)iaTe l^en iqom^oi^y ./?^)i^.. ,^ypotbpUc4 i^qfiiM»di(a4fttlli«nl/
hyjfi^^\9B,lgfii}^jliJ^if^e^^^(^ lU*t, ai?d ,U>eijt^jgi^rowi»g:off,jtl|#r')h3!
P9t4w»*».
the enthymeme is state^ ,9^^ qat^gprieaUyi. ta s^jqw tbatitbe eo^oltttion
^^^fifftSttlyifpt^^V logically t but ^Iso.thHt tUa .lurpipAiws,, frc^ m^ch the
s^p^cjjiajipaia d/;aw;?^^e aptuaL, ,Tlxtts if A aft4 ft ape siwiUa itban.A mAf
.a^H^oiiii^; but A ^u,d.B ar^.^jmilia^ thf?iefo/e a an^ ip^^tte-aiwiUa. . i
laiflfifi
^*^f^%i^ «^^<^P<^ip"ii'^^Wfi*^<5(ad by jT«»WP0|K», ^^-luH^i^it. all d^pewi
''W^.tf^P exbreseio.u> if 4, ap4 ^ *»'* sip^ jU^, . th^ < A.ftpd. G ,ai« ^iiaaiAy
ti»Ut
up9<^,A.^ B are siqxilia ,au^ auaii^ pr«aiis§< lyadiwatc^di {a ttM* 491)0^

^ism, A and B aresimilla, and B are similia^ therefore A and C are siini-
lia, any person, who looks at it, imd grants thai C and B are dimilia, will
readily go farther, aud grant that, if A and B are siniilia, if such l)e' really
the case, then A aud C are similia, and when you convince him that realty A
and B are siinilia, the hypotliesis is thrown off, and be acknowledges that A
and O are simlliu. In such cases the conclusion is not drawn frottnhe first
hypotlietical cuihymenie — if A and B are similia then A and G are siinilia,
hut from A and B are similia and the other premise, Band C aie similia, un-
derstood. If Socrates is virtuous, then* he merits esteem; but Socrates is
virtuous, therefore he merits esteein; why? The firtuousi tiierit esteem. Sit-
ciates is virtuous therefore he merits esteem. We dy uol consider it necessary
t« go into an elaborate discussion upon such matter^ we will, however^ aub-
jein a note.

Note.— It is strange that neither iVrch' Ishops Whateiy nor Sir Wm.
HaraiHon were able to sound to the bottom of what they call' li'ypothettcal
propositions, nor be able to perceive the true nature of the dilemma **A
hypotheiical proposition," says Whalely, "is defined to be. two or more cate-
goricals united by a copula (or conjunction) and the different kinds of hy-
pothetical prdpositious are named from their respective conjunctions: viz;
conditional disjunctive, causal &3." And agrain; "A conditional proposition
has in it an illative force, i. e., it contains two abd only two categorical pro-
positions, whereof one results fi^om the other (or follows from it)." And
again, "A disjunctive proposition may .consist of any membei of categttri-
cals." That a proposition may be the subject of another proposition is very'
clear; as that John is a schojor, is not denied ; but ilnU nfn! pr^por^itlou may
b« a dozen propositions is certainly very strange. Sir Wni. Uainilmti adoptl
ing the explantii ion of Krug says (page 168) "Alth(jugli, tsierefuie, an hypotUe-
tical judgment appear d(mble, and may be ciut into two dfirnreni jadginenis,
it is nevertheless not a composite judgment. For it is rt^ilized ihrougu il
simple act of thought, in which if aud TEtEN, Iho unii-cedent and cnntiequ*?nt
are thought at once and as inseperable. .The propo^iiinn if B is, tlien A is,
is tantamount to the proposition, A is through B. But tbi;^ ia aa simple an act
as if we cdtegQi'Ically judged B is A, that is, B is uu^fer A. Of llifse two,
nelthei' the one— If t^e sun sflmEs,— nor the othtri,— tiiE?f It is day — if
thought apart from .the other, will constitute a judq:ini^nt, btitonly the two in
coniunction,'* Nv\y the above ffe a misconception nf Uie nature uf prnposfi-

tions, and it arisesi fi-ona the erroneous notions enitt Lained by HamiUim aad others respecting predication. Suppose in the above example given, wu leave' the if and Trffoj out, we will then liave, thesuti sin new, it is day: Kuw Mr. Hamilton wouW admit tllat here are two propnsittons, bill would answer thatklihoi|gh there are two, yet it is not shown in any way Uiat the one Is connectecT or dependeUt upon the other withoUL the words tf and then- Very well ; take the pt-opositions A ik B, C is "B, A is C, and uitUuiU ihu word THBRkFORE, before the last one, it is n^t shown by words, tluit this'lslhe con- clusion of a syllogism. And if the words if jtnif tjjf.n [>oMi;e3s the magic power to merge two proppsitions 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 aa]!yp<^Hu.Tit^ii] pi[oju>£iiijob. For when we say if A is B tthd C is B, we expe(;t siijiutliitig h> ri>JlLivv^ 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 the cause and always accompanied by the effect B. Mr. Ham- ilton's erroneous notions of what he calls an hypothetical proposition led him. to misondersliood 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 anteceedent 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 sjrllogism aS a syllogism of two terms? and of two propositions, l^his is, however, error^eous ; for in an hypothetical 1 Syllogism, there are vtlnnjALLt three terms. That under this form of reas- oning, a whole syHogism can be envolved out of not more than two capital ' notions, depends en this, that the two constituent notions of an hypothetical i^yllogiam present a<?haracter in the sumption altogether different from what th^y exhibit in the subsumption and conclusion. In the sumption these no- tions stand bound together 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 oilier hand, the existsincf^ or non-ex.stance of what one or the other of these nolloDs com prides is expressly assertedj and thus the concept, expressly affirmed or exprtaaly deniuJ, manifestly obtains, in the subsumption, a wholly difiereQt siguilicauce from wbat it bore when only enounced as a condition of realiry, or unreality, and in like manner, thiit notion which the subsump- lion left untouched, and concerning* whose existence or non existence the' cocclu^ioQ decides, obtains a character altogether different lu the end from what it presented in the beg-in ning." This explanation Hiimllton obtained from Essfer. And hence fmiii 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 aeparate exlsteaccf*, but the hat is not the broom, therefore the two are separate existences, we makti a sumption to get at some virtCal third term, and thia third term is envolved, because the terms iu the sumption stand to- gether in lh(^ reliuion of reason and consequent, and in the subsumpjtion they they are asserted to be realitiesi^ and hence; the, third term; then in! the sub- sumptlou^w.e take the sumption to be actual and real, and by fliis method of syllogising, wc urote that the hat is not tluj broom, just as We supposed in th^ sumption, h is astonishing that a man of so great learning and natural ability'aa namiltoo should have b^cn drawn into tjiiis 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 founa, bolll in the subject and in the predicate, and aa thna a combination of an hypothetical form and of a di^uncttte form, they may also appropriately be denominated Hypothelico-di^unclivo. U x is A, it (x) i^ either B or (J — if an action be prohibited, it is prohibited el t tier by natural or by positive law.'* ♦ * * * *
Now 1 tipprehend, il will be impossible for any one to see why x is eitlier B or C, gnuiling thai x is A, withont goinej through the process — A is ehher B or C, x is A, and therefore x is eiClier B or C. Hamilton carries bis errors respecting Dilemmatic propositions into what he calls Dilemmatic yllogiams; but we will not criticise further.

CHAPTER XXI. •

THE SINOULAR 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 furfber application of this process In llie acquisition of knowledge. We have already shown tiiat from the combination of two ho-raouical propositions, as premises, we may gain similia or commeQsura in the conclusion. A.ud 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 hom«)nical propositions, all of which shall have A as the predicate, thus:
j Gregarium of B and A are homou,
Therefore similia j (" " C and'A are homon.
Therefore similia j / ** " D ami A arc liomon;
Thereibre similia^] ** ** E and A artj hoaaoq,
Therefore similia (, '* " F and A are homon.

And so o;i, which '1&9. continued syllogism or Sorites. And a mer^ glance at ll>e above chain of syllogismH 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, lor instance,,j4nd ^ stand for white, for Instance, we would say that Sw^n B, Sw^n C, Swai? E, ^nd all ^wans which we have seen, are white; they are a^l similia in tjjis facia^^^eg^xi^m. This is generalisation from experience. Ajad- by,thifi aid vl conversation and books, we can of course, use the ^xperfenc^ of others in the same manner ^s our own. Ami ^f from this experjencb we make an ^nfjt^r^i^qe bey^tnt} experience, this pr4>cess» which is.wholy syllogistic wiihin qxpef ieoce but no further, h^ been called by Bjacon, "induclio per enumeralipAem.siu^pI^ceui, ub; non reperi^^r iqst^utia contra(|ictofia."

But if fveretwru to the nominal irqtj^s spofceo of at ^he beginning of our inquiries,. any person will re?idily admit tii^ all colors, not only iho^j^, which have beep seen, but also those which can be seen, ^^ire visi^ble, i. e., visibifity finfi.^.siae qu^ no^ qf cplors arv* Uon^on Color, however. Is not an **g^ffii5.^^bu^^ simple .existence and therefore, not one of th<^ greo^^riapf color, imi ooipr itself and visibility are objectively homon, And an oyective homoB, however often its times can be heterated, is nevertheless always, l^o-moii<;tlme in' ltd modificattondof p«ist, present und Ait^re, cannot strengthen orw6i^^ our belief in i. hombn. If I take a' marble and inclose it Ih lii)' hand for four hours, when I irst put it into my h'aud 1 believe it to b6 ap lio-

monical tbingt end at the end .of fourciA^oui's I belijeye it tio b^ (he homonical things witi^out doubt; the mi4y thing, thstoafi 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 beteratioD 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 grcgaria by the poet«, it must be evident that^time per se has nothing 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 aflflrm 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 capiacity 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 inftommensuraie 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 lake 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 wili.be vdth it, and to distinguish the second homon from the first, we will call it an heterical homfln ; ab honionical 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 feimilical homon will then be similia. ' . / ' •• • ; ' • :

, Again; K theixomonijcal iKwion aa<^ .the li^Ksrioal homon bo iaterse differcptia, we may call the heterical homon with reference to the homonical homon, a differential homon. An homonical ["lou^on and a differential homon wilrthen be differentia. ' - ■

''Agiai?B; If the homonical homon and tha rhetorical homon be oommeo-«n4*a, ^¥ft may callAhe hetorlcttl i^omon ^ coramenaural homon. An Jiomonical bemon and ^ commensural homou will theii be commensura.

But again;, If, the homonicial homon arret the heterical h^mod be incommbnsura, we" 'may call the heterical homon,* an incommensnral homon.

An homonical honton and an incdmmensural 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^^,,„
^^^- Honionical hc,mon~a \ ^'^™^*°
o^ Homonical h«mon — a K ^._

Heterical homoo— b

f'

Qj Homonical homon — a J „j«,tK-
^*^' Similical homon-a' P^°^"^*-
.., Homonical homon—a [^iir ^^„,s^

zsfdiff,

Differentia) homon

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

Commenaural 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

honionical, may be constructed :

MODE l8T.

The homonical homon a, in the pIaoe-*B to-d«y, and the homonical homon — a, in any where a thousand years hence, are homon.

The homonical homon — ▲', in the plaoe->c today, and ibe homonical homon — a', a thousand y*jars hence in any where are homon.

Therefore the homfwical liomon — a, in any where aUiousand years hence, and the homonical homon a', in any where a thousand yeani beitde, ate similia,

MODE 2d.

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

The homonical homon — a, in the where, b to-day, and the heterlcfl homon c, in the where — D to-day, are hetera

Therefore the homonical 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.

MOD£ 3d.

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

100

'•>:. 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 thotrsand 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 wheiie 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.'

■ \f, , MODE 6th.

7{hi9 bom^nical hemon A in the whei*e b to day and the homon ical homon a in any where a thousand years hence are homonl

The homonical homon a in the where to-day and the incommensural faomnn c rn Xht wh«re d to«day, are incommensura.

Therefore,. tfiet.hdmoniesU'bomoi) a in' any where a. thousand years hedoe, and tb< iaDomm«a6ural bomon c in any where a thousand years hence, are incommensura. I 1 ..

1 After a oaueful study of the/ above mbde iti the singular homonical sgrttogisDit Ike foHowibg reasoning, we > belieyet 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^Vhtt'e B-ahd so oh, each one of these similia must have a common 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 itf believing that each one must be an a. fotlf ft'«Witild nt6tbe so, homon would not be hotnon; and that the really saitle thfttgihouWiiot be the same thing \h absttrd and inipossible. Btit 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 aiid 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 objectively heterical existences, one in,.|ach premise, must always be found in the pr,emi;*e8 of oye;ry syllogism. Ad4 hence the general propesiti<An that all colors are visible, is eslablishedi beyond a doubt ^y Ili(^ syllogistic process.

The propositioo that all sounds i^'e audible, or that souud is, lias hee\\^ a^cl ever 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 predicate are the simple ei^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, ai?4,«v«r will DC white to human beings, nobody doubts, because a contrjiry sqpposition is not only incouemivable but impossible, unless similia ai;id dif^f^ntia are homon. ^, ^ •

Let us now li^nn our attention to capacial gregaria, and we wil], flfst notice figure or form. It is a proposition not worth disc.ussing after what has already been said respjictiug homonical propositions, am), space, rtliai 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 thipgg 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

: must receive the name given to the homonical figure, which name now l^^.-
comes a common name for all similia. If for instauce we distinguish t'r,9m
other things any round riug by the name cikcle, then any round ring tl^us
distinguished from other things, has been, is and always will be a. circle
First round ring and a circle are liomon, sec«m4 i^QU.id ring and first, ar«
similia. Therefore second round riug and a (one) circle are hoi^on. Ai^d ,^ >
also with squares, cubes, triangles, paraUelograma, &c^

And it must be evident that if in f^Qy relation of parts, aQytjbiLQ|[.W}iJ^i?,^,
may be called a quality, be found in any figure, this quality mx^^l liayp a
simile ii? any other figure, which is a simile of the first, ngqre, ' Fax^ ^\\ tl»e
relatiotts of the space inclosed by th? outlines of any figure, nxust be,inp^se<J
i.n
like manner by the outlines of all figures whicl> are inter s^^imiU^.^ ' .CSejctain
points and their relations inter se in space constitute a figure, and whi^[),f^^
lay
down u\\ the points and their relations^ which that;^gureca^ CQnt^iju.'C,^:^ cix-
cleand another, are similia, the commensural rotation of the 4i^^<}te|* %p4 ^>^^
tiiird of the circumference is in the fiist circle, i,,evtbe wher/s qf,
^^c^,^(fqar-
mensural relation of points in^space and tlje wherq of th^, p<3ints cqpj^i^jg^t}
in the ftcst circle are homon, thejrefor^ this commepsur^l , ^eU^^O(i? , J^ .
itt«.^He
second circle: and as circles are slip Uia/4 spaqe, thi4.r,^JatiQHali§iji)}ie,v3,
ifx
all circles at any tijnq in any wheiie. And such is- the caae..^itb ^U the'g^t^7
metrical figuFes. \ , , . - .

But if. we copsidtjr tj^e forms qf an.ii?^als, veg^\,^b\^s, ,or niJAer^ls, w^^
will find but few per%ftt,lyj siniiilia. Jhe hvupap ttfVffii Uft^. no hQm/>4iqnl
standard by which to, determine similia. If wq shosuld give qeftWvMi f^tt^l
defiaite relations of points in space as the human foi;m,.wetUen might r§«^^
npon such, human fotni with logiqal mathematical ^erliv^nitf, ji)UtvQUA' rei^^^i-
ing would^only }}e approximately true when ^|)plie4, actui>lly U^ ind|vi(iu?^ls.

10b
For the homonical standard which we h^ve assumed, has not a simile in
each individual of mankind; yet there is an approximation to similia in tlie
forms ef human beings sufficient usually to distinguish the human form trom
that^f other animals. And this sufficient approximation te an homonical
standard in one spaces, and the approximation to an homonical standard in
anothei*, 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 lizzardare, have been and always will be diflferentia. The
huthan form, though not a simile of any homonical standard, is sufficiently
distinguished by its,relations from others; and were ic m>t so, we could not
tell the human form from others. We can not, indeed, point out any particn
lar in the form of John, and say that wherever man is found, you will And 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 ap-
proximation to these particulars. Of the forms of animals, vegetables and
minerals then, we can not usually find an homonical 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 mat-
ter is itnpenetrable ; and impenitrabihty being a f>imple 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 andimpenitrttbility are bomon; 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 are homon; an anokscupCed where and an occupied whei'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 inspaieeare similia, because space is space, hopion is homon; t,he capacity to ooCui>y, 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 homonical obejct remains in space, the homonical where, in l7hf<^ it is, cannot be occupied by an hetericat object, unless hetera and homon are homon, which^ impossible. So long therefore, as matter is

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 homonioal where of an homonioal existence called matter land ah (one) occupied where are homon, an occupied where and an unoccupied whdre are dilS^erentia; but if the homonioal matter in the homonical where be destroyed by heterical matter, the honr6nical where cannot be occupied by the homonical matter unless hetera and homon are homou, which is impossible ; therefore any matter must occupy space. This, however^ does not proye that matter canno^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 aonihilattid 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 diicussing, seems to be what J. Stuart Mill considers the true type of induction, wheu he defines induction to be "the operation of discovering and proving general propositions," Mr. Mill, however, like all other writers ypon induction, seems to have had no definite conception of the thing for which he was on the lookout, 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 "thatloperation 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 fVom 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 homoaical syllogism, we must pursue the syllogistic process still further and show how we reason by the Plural Homonical S5''llogism. If we put two balls before us, we will say that they are hetera, i. e., that the one is not tlie other; if, however, we turn our eyes away from them for a few momlent«, or cover them with our hand, and then we remove it from them and Kbok at them again, we will say

that they are the sufs balls. Bat by this expression we do not mean that the one and the other are homon, for we know that inter se they are hetera, biit what we really mean, is, that the two balls under our eyes thbn are the i49nitioal balls under our eyes now, i. e., the two balls then and the two balls NOW are homonical hetera. And before proceeding further, we must again ei^laiA some terms, which we will have occasion to use in our fntort Inquiries*

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

Again, If two homonical 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 homonical hetera; but if we take two other hetera, they also will i^main hetera, and to distinguish them from the first two, we will call them heterical hetera : Homonical hetera and heterical hetera will then be hetera.

Again, If tw» homonical 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 homonical similia ; but if we take two hetermal 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: Homonical similia and heterical similia will then be hetera.

. Again, If we take two homonieal^ietera inter se differentia, they will reqiain differentia, and we will call them hom9niGal differentia; but if we take twc other hetera inter se differentia, they als» will remain differentia, and to distinguish them from the first two, we will call them heterical differ entia: Homonical differentia and heterical differentia will then be hetera.

Again, If we take two homonical hetera inter se. commensura, they will remain inter s« commensura, and we will call them homonical commensura; but if we take two other hetera in4;er se commensura, a like cnse will be with them, and to distinguish them from the first two, we will call them heterical commensura: Homonical commensura and heterical commensura will then be hetera.

Again, If we take two homonical hetera inter se incommensura, they will remali incommensura, and we will call them homonical incommensura; bv^t if we take tw« other hetera inter se incommensura, a like case will be with them, and to distinguish them from the first two, we will call them

b0terical iDCommensura; Homonical incommensura and beterical incommensura will t!ien be hetera.

Again, If we take two hetera inter se similia, they will remain inter se similia, and we will call them homonical similiEt; 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 similical bimilia: Homonical similia and similical similia will then be similia. .

Affain, 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 fwo heterical differentia, and the one of the homonical differentia and one of the heterical differentia be inter se similia, and the other of the homonical differentia and the other of the heterical differentia be inter se similia, wa will call sueh heterical difi'erentia, similical differentia: Homonical differentia and similical differentia will then be similia.

Again, If we take two homonical differentia and two heterical differentia, and the homonical differentia and heterical differentia be inter so differentia, we i^ill call such heterical dift'erentia, 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 comiiensura 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 th€ 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 iocummensura 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 lattw, incommensural incommensura: Homonical incomnj^ejjisji|a^H^^M^mmensural incommensura will then be incommensura. ^

,, , Th9 follpwipg lis), will Jihow the terms and their relations:

J Homonical homa a.a.) ^ ^ ^T"""'?^] '•""?!? ^ ut I differentia.

Homonical homa a.a.) """*"• *'• Differential similia b.b.) "^"^*^"'^'»-

a . Homonical homa a.a. [v^*^,« ia Homonical differentia a.b.) ^j^tu^

•** Heterical homa a. ' a. ; [^^•^*- ^^ Similical differentia a. ' b. ' f ^^™"^*

o Hombnicalhetcraa.a.')upt^-a 11 Hom©nical differ. a.b. ? Hiffprpntia
y- H«teri«cal hetera b.b. ' f ^®^^*' ^^ Differential differ, c.d. [ditterentia.

J Homonical simiHa a.a. f il^4^„„ 10 Homonical com. 3.2.) ^ ^_^„.„.„

^•: SetericaUimiUaa.'a.' r^^^'^ ^^ C#m'sural com. 2'2' [commensura
- Homonical differentia a.b. } ^^.^^^ iq Ho'ical com. 2.2.] j„^^^^^„„„vo
^- Heterical differentia c.d. \ ^^*^^*- ^^ Incom. com. 3.3. [^°commensura.

gt Homonical comensura 2.2.) k«4.^^„ -u Hom. incom. 2.3. } «^^«,^^„„««
^- Heterical commensura3.3.)^^^^^^-l^ Com. incom. 2.3. j- commensura.

„ Homonical incomens»a 2.3. > K«f^vo ik Horn, incwn. 2.3.) ;„^^^«,^^„r.ro
^- Heterical inoem'ensura^.^ [^^^^^^ ^^ Incom. incom. 5.6. \ incommensura

Q Homonical feisa ilia a.a. ? -i^:!:^
"; ^milicaa9imilia,a.'a.' p'^^iiia.

Now the fQlk)wing paraiigsuB 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 E^Uogisms.

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 arc homonical homa; Therefore the homonical homa a.a. a thousand years hence and the heterical homa a. 'a.' a thousand years hence, are similical homa.

M<Mte Second — The homonical homa a.a. to-day, and the homonical homa a.a. a thousand years hence, are homa; The heterical homa a. 'a.' to-day, and the homonical honaa a.a. to-day, are heterical .homa; Therefore, the homonical hema 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 homonical hetera; The homonical hetera a. 'a. to-day, and the heterical 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 homonical similia; The homonical siAjiilia a'a. to-day, 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. te-day, and the homonical differentia a.b. a thousand years hence are homonical differentia; The homonipal differentia a.b. to day, and the heterical differendia 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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Mod« Sixth. — ^The homooical commensura 2.2. to-day, and 'the homonical commensura 2.2. a thousand years hence, are homonical commebsura; l^e homonieal c#iamaBsura 2.2. to-day, and the heiterical commensura 3.3. to -day are heterioal oommensura; Therefore th^ honvonical eomm«n8iira'2.2. aUM^usand years h«nee, and the heterical comiueDsiira 3.3. a thausaud years hence, ar« heCerical- oommensura. * i..

Mode Seventh: — ^The homonkial incommensura 2.3. to-^ay, and the homoDioal incommeasiipa 2.3. a thousand years hence are homoni<^al intsommtnaura; The homonieal incommei]i8ura2«3, to-day, and the htterical incommensura 4.5. t«-day. are h^terica^ ij^commiBnauva; Therefore the homonieal incommensura 2.3. a thousand ^ears hence, and the ht^terioal inc.omn^ipisura 4.5. a thousand year4 heiice, are heterical iucommensura.

Mode Ei^th.— Theliomonic^l similia a.a. to-day, and the homonieal simtlia ft.«,va'tbousanfll y^ahi^'hencci are < homonieal similia^ The sitpilical similia a. 'a.' to-day and the homonieal similia a«a. to-day are simtlieal similia^ Therefore the hoipaonical similia a.a. a thpi^sariid yearp h^ce, and th^ similical similia a. 'a,' a thousand years hence are similical sim,ilia. .

Mode Ninth.— The homonieal similia a.a. to-day^ and the hi^monieul similia a.a. a thousand years hence are homonieal similia; The liomonlcal similia a.a. to-day, and the differential similia b.b. to-day, are differential similia; Therefore thai homonieal slmjUa a*a. a thousand years hence and the differential similia b.b. a thousanU, yeavs hence are differential similia.

Mode Tenth. — The homonieal differentia a.b. to-day and the homonieal differentia a.^a thousand years hence are homonieal differentia; The homoueal diflPerentia a.b; to-day, and tne similical differentia a.*b.' to-day are shnilical differentia; Therefore the homonieal differentia a.b. a thousand years hence, az^d th$ similical differentia a.b.' a thousand years heaccf are similical differentia.

Mode Eleventh- — The homonieal differentia a.b. to-da.y, and the homonieal dift'erentia a.b. a thousand years hence are homonieal difierentia; The diflfereniial differentia e^.d. to-day, and the liomonical differentia a.b. to-day are differential differentia; Therefore the differential differentia e.d. a thousand years hence, and 'the homonieal differentia a.b. a thoufiaod years hence are differential differentia.

Mode Twelfth,— rThe homonieal commensi/a 2.2. to-day, and the homonieal commensura 2.2. a thousand years hence, are homonieal commensura; The commensural commensura 2. '2.' to-day, and the homonieal com mensura 2.2. to-day, are eommensural commensura; Therefore the comm^usural commensura 2. '2.' a thousand years hence, aod the homonieal commensura 2.2. a thousand year^ heuce, are eommensural commensura.

Mode Thirteenth. — The homonieal commensura 2,2. to-day, and the homonieal commlnsura 2.2. a thousand years hence are homonieal commensura; The incommensural commensura 3.3. to-day, and the houi6nicai commensura 2.2. to-day, .are incommensural commensura; Therefore the in eommensural commensura, 3.3. a thousand years hen<je, and the homonieal commensura 2.2. a tliousarul years hence, are ineommeosural commensura.

Mode Fourteenth.— The homonieal incommensura 2.3. to-day, and tjie homonieal incommensur ^2.3. a thousand years heuce, are homonieal incommensura; The eommensural incommensura 2. '3.' to-day, and the lionionical incommensura 2.3. to-day, are commensuTal incommensurH; Thei'elbfe the eommensural incommensura 2. '3./. a thousand yeais hence,. and the homor

cal incou^meDsura 2.3. a thousand ye^rs hence, are commensaral incommensura.

Mode Fifteenth. — The homonica] incommensura 2.3. to-day, and the hoinonical incommensura 2.3. a thousand years hence, are homonical incommen^ura; The incommensura! incommensura 5.6. to-day, and the homonieal incommensura 2.3. to-day, are incommensural incommensura; TbereforeHhe incommensura! incommensura 5.6. a thousand years hence, and the huQionical incommensura 2.3. a thousand years hence, are incommensural incommensura.

If the reader has carefully studied what we have called the singular homonlcal syllogism iu the proceeding chapter, the plural homouical syllogism will not need to be specifically explained. And aiiy person Cfmsee tliac we are not necessarily limited to two homa or helera^ we may ,t;^^,^ the bomonical homa or hetera a, b, c, d,.e, <^c., and ^eal with.Uiem in lik^ mtUDer as we have dealt with two homa.

Now if we take any simple existence in nature, any one will allow tliat 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 consequeotly it can not be a simile of itsell^ nor can, it and ilsielf 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 homonical homon. If then we take any sine qua n«n, impenitrabiiity for instance, this sine qua nont8impenitr«bility today, always has been and always will be, homon is bomon.

Now if we place before us an ivory bali, w.e hare no doubts in aflBrming that one of the capacial gregaria sine qua non of this ball and impeuelrability are homon; and it we put before us another ivory ball, we will make a ike affirmation respecting it, and therefore the first and second balls are similia. And if the first gregarium be located in the homonical where B, and the second one enter the homonical where B, the first one must ttike an heterical where. For, iu the respect of impenetrability the two aalis are similia; and therefore the homouical similia a 'a. to-day, the one (a) iu the homonical where B,and the other (a') in the where C, and the homonical similia -a.' a. to-morrow in any where are homonical similia. But respecting the homonical similia a.'a. to-morrow, if the second (a') be lu the where B, i. e., if the where B occupied to-day by theiir^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 lime.

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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 impenitrable 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 hooioa, 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 homonical pro-cess 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 homonical differentia a.b. by the homonical process d, will have a simile of that result brought out of the similical differentia a.'b. by d', a simile of the homonical 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 homonical differentia a.b. by the homoni-cal process d and A ijre homon : The homonical differentia a.b. with the ho-monical 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.' hy 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 Ihan 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 obscui 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 pi'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
tiieory to cement and make his remarks understood. History and experi-
nienls, without the knowledge of the inductive processes and their applica-
tion can not aid the undeistanding in gaining certain knowledge of nature's
laws; and tliese 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 thougli
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 wliich
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 syitem 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, Iiowevcr, who has done more, perhaps, than any ether, in clearing th« way, is I. Stuart Mill. His treatise upon logic is learnc<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 otiiers, we do not consider 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 establish^ by the singular hamoniCHl syllogism, as we have shown heretofore. Neither do we consider ijiduction 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 Archbishop 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, nmjjfr 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<liseeDt altogether from Mr. Mills definition that, "induction may he considered 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 considering induction to be generalization from experience. We have hereto/ore shown that, generalizatioH 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 probable 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 tliat the induction, if it le 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 cliange that sUv^h will be the case hereafter. But from the circumstances that no exception to a certain uniformity has fallen within the ex^ perience of mankind, we do not infer by the inductive process that there will be no exception hereafter. From the continuous uniformity, extending fhr<iugh experience, we are led to believe upon the ground of probabilitv fhat the causes producing such uniformity will continue to act without interruption, though we know not what these causes are, nor that they will cert.iinly 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 ex perience of mankind, are so, re^ts entirely upon probabilitic's, and not upon induction unless the inductio perenumerationem simplicem be true induction. If it had alwaj-^s happened within our experience that every Friday brought some ill-luck, the inference that every Friday in the future will be unlucky, W(Mild be just as probable to our mirKls as the case of animals with horns having cloven feet, yet there is nothing in tlie nature of such inference that corresponds to what we meou 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 whidh direct observation had in the work c<»nsi«ted in ascertaining at one jind the same instant, the zenith distances of the moon. f\% seen fmm two

1 oints very remote from one another on the earth's surface. The ascertain- m^^nt 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 sperical 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 qundrelateral being radii ol 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 uf 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 th^re 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 Buok 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 eflects 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 Hub regard any 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 likij causes wiih 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 l)eing 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 suriounded 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 nmde 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 m:ike one inductive inference, when he inferred thatth« planet would continue to revolve in an elipse. Now if this inference was made upon the grounds that like causes

will produce like effects then the isference was syllogistic; but if it was made apon the grouads that the planet had always gone in an ellipse hereto, fore, the inference was a probable one; and in no 'case conld such inference be made by induction.

The(>e 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 dlreotions, we will proceed and come nearer to the subject, and explain what we consider to be true induction.

CHAPTER II.

INDUCTION DT8TTNGUI8HED.

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 inquirers, it seems necessary now to state what we mean by induction, as well as words can express our meaning in brief, and U$ 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 bv 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 ags^regate existence, and before we have the knowledge of effects, determine such existence to be or to contain a potential canse of any given effect. «And in studying the inductive processes we must always have seme 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 o(cause and effect, determined that tlie 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 inductive processes commence to search for them. If tha reader wil! bear this in mind it will free the subject from much obscurity, which otherwise surrounds it.

And since cause and effect are always involved by the inductive processej, it is necessary also, to put the reader upon his guard tj^f^gl^nay not

contound what are called a priori and a posteriori reasonings with induction. After that we have gained the knowledge of certain eflfects and tlieir causes, we look upon these causes and their conditions, and infer, by the])1unil 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 homonical 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 discharge 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]ogi8m, wheo we have an effect whose ciuses and conditious we know as the hf^monical homoo in the premises, and we infer the causes and conditions 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 wiihoul; our knowledge, 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 syllogistic and thpt they proceed from certain known cases to infer respecting similical cases, while the inductive processes proceed from a given phenomenon lo mvke kno.%'u to us the causes and conditions of that phenomenon, we will proceed farther, hoping that we will not be misunderstood

N<iw in speak ins: of cause and effect, it is usual with ohihisophers to c..:: :l.eciti:.c a., sinlecedent and ! he effect th^'ife!f^(^4^^98¥hese terms.

aotecedent and consequent, bave reference to the relatione of points in time, and we liave already shown heretofore, that time possesses no capaeial 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|antercedent 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 tliat time and space can not be the causes of any thiojy:; they are however th« conditions of all causes and effects, and they are the only things of which we shall speak in our future inquiries a3 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 bern 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 (»f space.

We define causes therefore, to bethecapacial gregaria of the aggregate existences from which g\vQn changes or effects spring. To go behind the eapacial gregaria of aggregate existences and inquire into the ontology of these eapacial gregaria is no part of our undertaking at present. We may say. Indeed, that they are the maffestatlons of the Deity's will, i. e,. that they are the eapacial gregaria of the Almighty himself made tanccable to us; but we take these eapacial 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 homonical eapacial 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 eapacial gregarium of impenitrability, i. e., the power to remain in space, we must see that this eapacial gregarium ytev se can produce no effect whatever. If the ball l)e at n^st its impenitrability can not start it, and if it be in motion its impenitrability ca)^itn(^l)#£^IIMhii impeni

ir.bility in the ball can per se produce nothing. But if an other ball po»—scssing also imperitrability be brought to bear upon the first one, the heteric&l impenitrabllities, on3 in each ball, can inter se produce an effect. Homon l>er se must always remain homon, and per se no effect can spring from an homonical gregarium ; and hence all effects in nature are produced,'not by an homonical gregaridm, but by heterical gregaria. And as the capacial gregariaof 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 seperate them from others.

And in contemplating the aggregate existences, whose capacial grega-ria are causes, it will readily appear thai aggregate ex!stenc3s may be dirided into primary, secondary, tertiary and quartuary aggregations. By a primary * aggregate existence then, we mean what is usually called an •lementary 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 existance, a jar of oxygen for instance, as this is an ele-mentary thing, it contains all the capacial gregaria of any oxyi?en. 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 experi-ment with certain oxygen giving a certain result will under like conditions give a simile of that result with any oxygen; and so also witfar any other primary aggregate existence. And the differential elements constitute the primary aggregate existences in which reside the /;apacial gregaria which are the primary causes of all eft'ects in nature. These elements combi^ne and furm chemical compounds, which possess capacial gregaria different from those possessed by either of the elements entering into thf^m.

Now every capacial gregarium possessed by a primary aggregate ex-istence, 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 existances, 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 mauaer and with like inlcreuces, wc may experiment byi^tiPiftgljlfregaria in

fasciculo, with aggregate existences themselves. Having now cleared the wa3% as we hope, we will in the next chapter proceed to explain the conditions of time and space, wliich regulate the causal gregaria, and we will then see the manner of proceeding to some extent, and the reader will be able to un-derstand better, what we mean by induction.

CHAPTEU III.

CONDITIONS OF TIME AND SPACE.

We iuwe already said tliat the CT»ndition8 of causes and effects $re time and space; we liave also sliown, that not an homonical gregarinm but heter-c.il gregaria are,lhe causes of every effect. A.nd in a pfrevious chapter upon cause and effect we showed that, in every eflTect some homon becomes hetera or some hetera becomes liomon, some similia become differentia'or some differentia become similia, some commensura become incoraensnra or vice versa; this, we saw, is a condition of causation. And if we take two ivory

ball?*, ciach of whicli possesses impenitrability, we must see that the impehi-irabijities of tlie 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 ettoct can be produced by ihem inter se. If an effect is to be pro-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 clfct;! can not 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 cau.sc>s of effects, which begii 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 remo'val 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 ail 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?^

ill an)'^ 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, wliich are the causes of any given effect, these gregaria must operate through the space situated between the two airgregations.

A B

If A and B be two aggregate existences witli a certain space between them, and 4- 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 enegies of A take ihe diie(;lion only towards D, and the energies of B only towards C, then tLe spaces of liie^e heterical energies will always remain hetera, and no effect can follow from tiiese heterical energies inter se. The conditions of agi^reg.ite existences in space, therefore, necessary to causation, are thai, the iietericnl gregaria p«)a-sessing heterical wheres, shall find an homonical where, i.e.,tijat their wluiiea shall in some point of space come to b*) homon. And it will readily be sug-gested that, though these energies may take the direction towards each olhcr, yet they may not meet.

A C D B

Thus: Suppose. A to be a magnet and B an iron filing, if A's ener!xi<V"<
terminate at C and B'o at D, tiien 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 conv»ilions sine
quibus non of causation; and all the gregaria, which can be causes, must
come into thege 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
oblects 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 sirailia,
i.e.,
by similical similia or similioal 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 low proceed.

CHAPTER IV.

HETERICAL INDUCTION- r^r\r\n]r>

-,,,,„ , Digitized by VjOOV It.

We have heretofore treated of simple heteration and sho9n that the
power of the mind to heterate depends upon time and space. The succession

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>f our own ihoufifbts in time enables us to lieterate them, and the revolution
>f Ibe earth and of the heavenl}' bodies in time enables us to fix upon any
particular period of time and hold its relations in our miud. By the where
Df ourselves and the where of other objects in space and tiieir relations inter
^ we are also enabled to locate a particular where in space and preserve its
relations in our minds. And althousrh wc may not always be able to point
out the precise i)oint of time, in which a given effect l)egins to take place, we
can generally come near enough to that period for the purposes of heterical
indTlction; and so also we can come sufficiently near to the precise where in
fpace of a given effect. Simple heteration is sufficient to bring us to the
point ot time and the point of space of any given effect i nder consideration
of the inductive processes. And when we have the period of time in which
any ^iven 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
«f tinje, no aggregations before or since that period could contain the causal
gregaria of that effect. If the ^nead was written in the age of Augustus,
no person, wlio 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
hny given effect took place, all aggrejgate existences, which have not an ho-
monical 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
Uoovvn out those exist'3nces, which could not have been the causes, we have
hcfore us other existences, which may hare 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
musi have been heterical giegaria concerned in producing it, we would know

by tlie heterical induction of aggiegations by their times alon« 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 hom)!iical timeof 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, tluMxMoHt, 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 s me ii - stances, yet in others it is attended with great difficulties. If we .'ce an object in motion by heterical impenetrabilities, if a ball be started by the imptict

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

And all hogh we can €10 1 tell but that other existences than those ingredients which enter into compounds, may havo something to do with ilic compounding of those ingredients, yet if tlie action of these otlier existences be always constant at all times and places, whenever and wherever a givfu eflect IS offered to our senses, for all practical purpose* their action may he omitted in our considerations wilhout any error to our principles (>r results. Thus; although we may not be able io heteraty the spac, which bounds and limits the capacial gregaria of the north polar star, from the spa:;v in whirii pine shsvings are burning, yet if the iiitiaeiiee of t ic norih star be constant whenever and wherever sh.ivlngs and fire are found uj)ou 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 dcltrrmine and limit in space; and if their space and the space in which shavif^^s arc burn ing be hetera, we may immediately heierate tliose oilier aggregilins 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 purnoses ot the heleiical induction of aggregations in space, we must follow Bacon's rule of varying the circunistances, 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 efiects. S.Mnetimes by observation upon numerous instance.i of similical effects in nature, we are able to heterate aggregate existences from others containing the causal gregaria; and yery 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 aggie gations, oxj'^gen, hydrogen and sulphur, in one instance, and in another io-

stance, he find a jortion of water to contain oxygen, hydrogen and potasiura, he may then, '^ the latter instance, heterate sulphur from the sine quibusnon of water; for, in the latter instaiwje, water occurs wilhout sulphur being in the homonical space of the effect: and by the former instance he can heterate poiasium from the sine quibus non of the effect. But it is not quite clear from the above analysis of the chemist, that both potasium ^nd sulphur can

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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 tnc 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 ot 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 heterical 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 diflerence is that in analysis he must seek after the aggregaticms, 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 eft'ect without inquiring after them.

And in general, if we supjiose 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 aajgregations severall}^ 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 witho jt the presence of^some of the 6thers% unless we can find an instance in which they alone are present. Bacon*s rule of varying the circumstances, or of examinintc 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 heterical induction can proceed may be explamed 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 instancu enables us to bsterate b and c from the sine quibus non of such similical effects, and the former instance enables us to heterate d and e IrotH 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, li, 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

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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 efiects a, b, c, and from the gregaria of a, d, e and x, the effects, a, d, e, and Irom these data we can heterate b and c, and d and e, from the sine quibns non of the efiect a &c.

Heterical inductions are made daily in the transactions of life and always have been so made, though like the syllogistic pro«es8, the modus operandi of the mind has not been well understood. A very simple case of heterical 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 tiifte when the crime was committed, a hundred miles from the place in which it was done, the accused is heterated fronl the causes of the murdered man's death. The principle of heterical induction may be summed up in the foUowinpj heterical 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 aggresrations 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 out4n 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 Ihat 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 ^he lime and place of a given eflfect, be a sine qua non of that effect, we first ascertain, if possible, all the aggregations f?ulfilling those conditions, and then we find an other case having all the aggregations as before, excepting that aggregation, »¥hose 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 aggregattions fulfilling the conditions of the time and place of, the effect a, to be

a, b, c, and d, and in an other case we find a, b and c withtmt d in like conditions as before, Without the effect a, we then have the data from which to make the homonical induction, that d was a sine qua non of a. That the ;sun :s a sine qua non of day may be proven by taking the case of a bright I 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 re<rolves and takes us iaway from the sun.

I And it is no matter which of the tw(; cases, one of which contains all

the aggregations aad 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 commence, all the data of tke two casej required are furnished. Before the sun rises, we have the aggregations, a, b, c, . .p witheut 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 fltod cases by which we can thus try successively each (me of the aggregations fulfilling the conditions ©t time and space, we may find, by homonical in-(luctioD, 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 an homonical 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 similical time and place without the effect.

If there be more afi:gregations 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 ett'ect follows, as the effect a does not follow in the former case, the additional aggregation f ^vouid not vitiate our iifference 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 8ine qua non in the former case, unless f be a preventing cause in the latter one. But for entire certainty it is neceisary 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 ©f the effect a, in the former* case. The principle of homonical induction may be summed up in the following homonical proposition; whatever existences are sine quibus non in the homonical time and place of an effect and the causal gregaria of that effect, are homonical.

CHAPTER VI.

DIFFERENTIAL INDUCTION.

We have already seen that the homonical a and the homonical 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, tkVe 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 dift'erentia are the causes of every effect. The homonical a, and the heterical a, are inter se hstera, 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 tne 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 hcterical 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 ^'lace of such effect, as we may iiave determined to be the case by a previous homunical 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 tlie 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 eft'ect, wliich 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, whicii by previous heterical and homonical inductions we know to be the aggregations containing the causal gregaria, and the gregaria ef each of which aggregations we know also. There may, for all that yet appears, however, be otiier 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 givea effects, may be differentia. But suppose there be other aggregations containing other causal gregaria of an heterical efrecl 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 efl'ect is but another instance of like causes, i. e., the caub>

«.»! ^SflF.....^

aggregation and f in the second, for instance, if the causal gregaria of an heterical A\Aand 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 tlie 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
foi 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 ihe 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 efi'ect 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 con nection with the aparatus of the ear produce a eertain soun^., then a simile of that sound, the aparatus of the ear remaining the same, can not bo produced but by a simile of th6 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 eausal 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-

.^e * t- « _ _

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 reason Id like manner respecting the effect, which must spring, if at all, from the differential differentia g and h. So ttio 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 thrnughout nature. And hence it must appear that effects inter se similia in every respect must be produced by similical gregaria, either similical similia or similical differentia; differential similia or differential differentia cannot produce similical effects. And theref(Tre if two or more aggregations come into the homonicallime 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 circumstances, and bj'^ doing so we are often able by heterical induction of gregaria to eliminate certain gregaria from the differential aggregations combined with the similia of the other aggregation in the given instance; then we procoed farther.

And it must be remembered tha^ two gregarial similii cannot exist in t'.ie «ame aggregation. Thus; iron possesses hardness, and there is an homonical 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 aggergatioqs, 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 hydrogen unite and form water, the two aggregations, in a measure merge in the effect — water, i. e., although the weight, impenitrability, &c., of the separate 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 t« differential 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 coniitiona, 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, aad 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 gregaiium, 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.

2d.

A and B produce a

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 homonical time and place of the effects, if we desire to find the cati^al 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, E&c, which has a simile in B, we know that this similical grugarium in B and the causal gregarium, or each of .the causal gregaria in B, if there should be more than one causal gregaiium 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 inductiou, 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 tbem, and then differential induction is rendered still more complicated and diflftcult. 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 similia 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 eflfect at ail, and if B and C produce no effect at all, it is evident that tne proximate causal gregaria are in c and B. And if c be a permanent effect, w« may then deal with C and with B in the manner abore given; but if c be evanescent we are not able to manage it in that manner. If nitric acid and platinum in an homonical time and place produce uo 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 diff'erential induction as explained above.

But suppose, as before, thai A, B and C produce the eff'ect a, and that A and B actually produce b, and A and C produce c, aud 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, aud 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 &o of c and d ; and in this manner we can ditt'erentiate the gregaria of c ami d fVom tlie causal gregaria of a.

When four elements enter into a compound in a binary manner, diff-erential induction is easy. When A and B produce a, und C and D produce

b, and if a and I) b*^ permanent effects and they prodnce 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 caudal greg-iria ot c in a and in^. But it may b-* that A, B, C and D contain the still more remote cau-jal gregaria of a; A and B may produce b, A a-id C produce c, B and C pm.luco f, or th(' operatioi. muy be still more complicated and then tijj-ie resultant cffycls produce their effecits and the last mentioned eff'ects produce still others, and so on to a given eff'ect 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 gre-garia being put in the conditions, in which certain causal gregaria produce a giveu effect, and they do not produce a simile of that effect and the causal gregaria of ihat effect are differentia.

CHAPTER VTI.

81MILICAL INDUCTION.

Having treated in the preceeding chapter of differential induction we will not find much difficulty in understanding similical induction, «nd w

need not spend much time upon the subject. But in •rder to assist the un-derstanding let us represent aggregations by the capitals A, B, C, &c., and their effects by the small letters a, b, c &c., aid let us form two tables as before :

1st.	2d.
A and B produce a	B and A produce a
A and C produce a	B and G produce a
A and D produce a, &c.	B and H produce a, &c.

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 similie 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 pet 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) prodace g, and then d and g produce a, we may continue our intluctions 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 Hggre;.':Hti(>n are inter se diflerentia; in similical induction, the respect in which a<»grei^aiioiis, all uf which contain causal gregaria of a given effect, are inter se similia, and the causal gregarium of the given effect in any one of llie aggregations eom pared are inter se similia. And if two ag^re.i^ations containing causal gre- garia of a giv^etf effect and compared in the manner above stnted by inter se similia only in one respect, that respect is the causal gregarium of Mie effect existing in each of the aggregations. The principle ot similical induction may be summed up in the following similical proposition ; whatever gregaria in similical conditions produce similical effects, are inter s« similia.

CHAPTEH VIII.

INCOMMENSURAL INDUCTION.

We have seen heretofore that, commensura and incoinnieasura are relations which have an homouical 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 aud b be inter se diff erentia, a cannot be equal to b, i. e., a=«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 be- tween the aggregation in which the eftect is grounded and the other aggre- gation containing causal gregaria; or else by reason of the incommensural

relations between the quantities of the causal gregaria at homonical or heteri- cal 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 leaye 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 heteri - cal instants of time the caises 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 quan- tities 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 limes, more of the radiated influence than a similar and commensural body at b, i. e., the ett'ect grounded in the body at a and the cfftct grounded in the body at b will be incommensura. Attain:

B

C

1

o

If there be two pibcjs of iron, whose weights are inter se commensura, attached to the lever A 0, the nm at B a.id Iho other at U. their forces exerted upon a body at A will be inter se incommensura 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 incommensura.

And we must bear in mind iliat the incomnriusural effects, which are to be the subjects of incommensural induction, are grounded, and witnessed by our senses, in one of the aiJ:gregations containing causal gregaria, and oui object IS to find the other aggregvf ion or aj:gres:ations containing the renidiaing causal gregaria. Thus; if A and B at one time produce a, and at a ;

other time A and B produce a', and a < a*, these incom men sural 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 incommensura, 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, supi»ose the effect a grounded in B to be incommensurated when B approaches or receeds 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 iicommensurated when B approaches or receeds from A, then it is evident that A contaius causal gregaria ot a. That the earth contains causal gregaria of the gravitation of terrestrial bodies towards its center is evident by incommensural induction. On the oppojite sides of the earth at tlie same \\\\u\ wli^u tl>e same stars contain between them and the eartli one set of terrestrial i»()dies

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 inconinieiisuia at incommensural distances from the eanli's surface.

In the foregoing example we have seen Ihat, fiom the inconHnensurnl relations of space between aggregations containing causal gregaria iucniu-mensural effects arise. Incommensural quantities or intensities ot caubal gregaria, their times and spaces remaining commensura, produce also incom-mensural effects. If a barometer be placed under the receiver of an c»ir pump, and the quantity of air be increased and again diminisijed, and sucii incommensural quantities be attended with incommensural effects upon the barometer and the influence of all other objects be heterated from the homonical time and place of the effects, it is evident that the pressure of the atmosphere is the cause of such eftects. And hence when effects grounded in certain aggregations are incommensurated and we can perceive by obserra tion, and still more when we can we can make the experiment, that th<? quan-tities or intensities of gregaria in some other aggregation are corellatively incommensura, and we can also heterale other objects, we may be assured that the correllative incommensura are connected with ilie eft'ects by causation.

And again: the relations of time may enable us to make incommen-sural induction of the cauees of incommensural^ effects. All hough we can

not in one day or in one year perceive any material ciiange in the falls of .^N'iagara, 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 incommensura in incornmensural times, other things being equal, from the incornmensural 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 incornmensural induction may be stated in the fol-lowing tncommen^ural propositions: The relations of the times ©f causal gregaria to incommonsural effects, spaces and quantities being commensura, are incommensura; the relations of the spaces of causal gregaria to incorn-mensural effects, times and quantities being commensura, are incommensura; and the relations of quantities of causal gregaria to incornmensural effects, times and spacer being commensura, are incommensura.

CHAPTER IX.

OOMMENSURAL INDUCTION.

We have seen in the previous chapter that, incommensural effects, timet ^ eing cor.Mncnsura, depend upon incommensural relations of spaces orof quan-liiies between the causal gregaria; and, on the other hand, commensural effects, whose times are commensura, depend upon commensural relations of quantities or of spaces between the causal gregaria. And we must always bear in mind that, not an homonical 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 ot them in some other aggregation, for which we are seeking as the cause of the phenomenon, when a magnet attracts iron-filings, soma of the causal gregaria are in the maTaet 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 wei<4ht o be attracted through a certain space A in the time d, a magnet contaiuin£c2A 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, tT\'enty-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 sc commensura or incommensura, are always inter se similia.

SuDDOse then that bv observation or exoeriment we find, first by a

homoDical inductioD, 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 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 ef space between thg 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 homonical hetera, but homonical 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 homonical 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 homonical 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 homonical 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 ot soap will not cleanse any object, with which it docs 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

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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 aggre-&:ations, 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 remore 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, a1 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 gree:aria, 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. Ic is very seldom, nowever, 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

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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 perceptional facts immediately noticed by the mind, while our knowledge of what we have called capacial gregaria is derived from a comparison of perceptional 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, 1 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 ejregariain various substances'by observing the facts which spring from them when applied to similical substances. Thus, supposing our organs 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 emetic 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 difforentia. And so we may try any two or more substances with pure water or with anj' other thing, and in this manner determine similical gregaiial, 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^articular instance but in respect to all instances of similical effects. In the complicated 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 p henomenon disappears, in which case we are accustomed to call the cbssatio:n of the cause of its production, the cause of its disappearance. We are accustomed to say that the want of wat«r 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 phenomenon, 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, llie 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 aergregations, one of which produces the effect and the other not, the gregaria which are inter se similia and the causal gregaria are later 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 difierentiate 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 aggregregation in which some of the gregaria existing as similia in A, B, C and I), 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 exist-

ing 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 mther in science. That the oscilations of the pendulum are caused by the earth, i. §., that the earth contains causal gregaria of these oscilations, and also that the earth contains causal gregaria of the gravity of terestrial objects, was proven by incommensural induction ; and then Newton by commensural inductien 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 whieh 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 previ-Qus 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 •(induction.

In what Mr. Mill calls the method of agreement there is the mixing together and confounding ot 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 with it in 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 la

every case from which the effect arises, which can be done only by similical induction.

Mr. MilPs 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 gregaria 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 gregai-ium 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. Ou 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, altliough 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 homenical 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 concomttant 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 wiih 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 assuir'* certain hypotheses and from them determine how nature should exist s

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 hppothesis ; 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, aad 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 hopothesis. And hence when we have laid down an hypothesis, our object must be to prove or disprov3 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, similical, differential, commensural and Incommensural hypotheses.

In heterical hypotheses, which seem to be tlje 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 grescaria 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 ons, i. e., this horse and the one we first saw are hetera, and then we must look for the evidence to prove the hopothesis. And if by investigation we find that the first horse has been continuously and is now in th6 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 h©monical 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 iBstanco 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 Balso along with Z will produce a similar effect, and we can perceive that A possesses gregaria, which 6 does not, we may heterate those gregaria contained by A, but not by B, from the causal gregaria of th) effect produced by A and Z, and thus prove the heterieal hypothesis respecting those gregaria, if we have made ene. And we have already, no doubt, gone far eiiough to 8«e that heterieal hypotheses, respecting the existence of any phenomenon, to be worth anything, must be susceptable of proof by simple heteration, and that heterieal hypotheses respeeting causation must be proven by heterieal induction.

Homonial hypotheses also respecting causation must be proven by homonical 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 inquiry. Homonical inductions, indeed, are best and more frequently made by experiments than by observations upou nature in her undisturbed processes offered gratuitously to our senses, and therefore we would more frequently resort to experiments to prove anyr homonical hypothesis. If, for instance, we should suppose that, it is the equal pressure of the atmosphere upon unequally balanced columns of water, which force the water up the shorter arm of a syphon, we could make experiments from which an homonical 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 homoaieal induction, aud if ever proven, (and without being proven the hypothesis amounts to nothing) it must be proven by simillеal induction. An homonical induction can not be made in any x^ast, unless the existence of aggregations containg 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 homonical induction in the case; for although <w.e should find that B and C alone will not produce x, that is no evidence of the agency or existence of A in the former case Homonical hypotheses respecting causation, to be useful in increasing our stock of knowledge^ must be susceptible of proof by homonical induction. And no hypothesea 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 indnction. We might. suppose, for instance, that the quality of dissolving upon ^e. tongue and the causal gregaria of the taste in common salt are differentia { tmd by esamining other substances containing this quality, we could prove our hypothiesis. 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 bo 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 aro, 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 hypothsis. 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 Qertain of the existence in any place, of an ether, whose vibrations would produce light, we could prove the ethei-eal hypothesis.

Respecting incommensural effects, we may make three suppositions, viz : first, that the times and spaces being commensura, tho increase of the quantity of gregaria in a certain object incommensurates the effects ; second, that times and quantities being commensura, the incommensural effects depend upon incommensural relations of space; and third, that spaces and quantities being commensura, the incommensural effects depend upon incommensural telations of tipe. 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 hypotbesos 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 inversly 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 ibnnd

by making calculations of what actually occurs, as observed, in this respect, when bodies fall without being impeded.

Bespecting 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 ratiocinatien.

We have now completed our view of ratiocination and induction, so tar as wc propose to treat of them in common language. And we may well consider of what value these speculations may be to the cause of sciemce. 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 ef 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 formnlsB, and to apply them to the actual phenomenon of nature will be our object in Book III.

BOOK m.

CHAPTER I.

SIGHS IN RATIOOINiLTION.

In the two prerious 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 sul^ects 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 eommensural and incommensural propositions, with the syllogisms constructed upon them, however, have been expressed and wrought into Algebric formulae, which can be transformed in various ways, and thereby unexpected and grand iresults 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 ef 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. y^ » A.

Let the sign %^ stand for an homonlcal comparison ; then, lom, 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 propositioo 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.

2

Now by the use of the foregoiD.2j signs, we can combine the six kinds of propositions in all the figures and modes of the syllogism. Thus io mode 1st:

aAa or aAa
II or H- .
a' Aa' or a' Ak
.-.a II a', or .-.ahha'.

And these sylloijisms 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 firgt 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 interpet 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.

*' '' "■ VV " " hetera.

" '' " V II " " similia. ^ I

" " " VH- '' " differentia, ed by LjOOgle

" " " v~ " " commensura.

" " " V < " " incommensura.

Let the sign, || A indicate similical homa.

hete^a.

" " similia.

" " differentia.

" " commensura.

" " incommensura.

" differential homa.

" " hetera.

" " similia.

" " differentia.

" " commensura.

" " incommensura.

** commensura! homa.

" " hetera.

' ' similia.

" " differentia.

" " commensura.

** '* iujcommensura.

" incommensural homa.
" lietera.

" " similia.

" " differentia.

" " commensura.

'* " incommensura.

indicates tlie comparison between the terms of the propositions. Thus; in the equation, a+b=:*+b, the sign ^ expresses the comparison between a+b and a+b; but if a=:b, then the expression a+b= =a+b means, not only that we have an equation, but also that the existcaces 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^ 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 Algebra, and the following paradigms will show the plural syllogism.

PLURAL SYLLOGISM — PARADIGM IST.

V

'!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.

A..B A A A..B

II li

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..B1I 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 loth.

A..BVVA'..B'

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

Mode llth.

A..BII

CD A
-.A..B il

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

Mode 12th.

A..BII HA'..B'

A A

CDv liA'..B'
.-.indefinite.

Mode 13th.

A..BII |(A'..B'

^ A A
CDH^nA ..B
.•.A..BH- II CD.

. Mode 14th.
A..BH-K-CD

A A

e.fah-cd

.-.A..BH-H-E..P.

Mode 15th.
A..l3hhK-CD

A A
E..FVf+CD
.-.indefinite

Mode 16th.
A..BH-H-CD

AA
E..FII H-CD
.-A..BH-H7E..F.

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.

PARADIGM 2d.

Mode 1st.
A..BaAA'..B'

CDaaA'.TB'

.•.a=..bacd

Mode 2d.
A..BVVA'..B'

A A
CDVVA'..B'
.•.A..BVVCD.

Mode 3d.
B..B= =B'..B'

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

.'.indefinite.

' :%■

cd<aa

.-.indefinite

'■J'

Mode llth.
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

■ A A
E..Fv<CD
.-.indifinite

Mode 16th.
A..B<<CD
A A
E..F=<CD.
.•.A..B<<E..F.

Now in m(.de 1st, of paradigm Ist, 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 2(j, for similiar 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 acd the homonical A lo-morrow have heterical points of time, and they may have heterical whkres, one lo-dav 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 WHEKES-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 fol* time, but for times between which there may ie 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.8..

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..BA aA'..B'.
And this preposition may be stated in c(Tlnmon 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 witli 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

T. S. T. 8. T. S. T. S.

A..BaaA'..B'. A..BavA'..B'. A..Bv AA'..B'. A..B\/VA'..B',

In the above proposition »^ the times have reference to the temporal relations between A..B..A'..B' and the mind of the thinker, i. c, to the relations between the objective aggregations aid tiie subjective conscious truths. And we can easily see that a rwse blooming on the tree and the tree itself have an homonical 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, ,\]\e 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. 8.

(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 firtt 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

The premises in modes 8 reduce as follows:

(li.)
AV A^VV ^V
1st., preoiise, T. ». T. S. T.8.

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

A V Ay

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

A'..B', CD

(i.)
A A
horaonical hetera,andas T.S. T. S. T. 8.

A V A A

A'..B' A V A'..B\

therefore the concluai'in, T. S. T. S.

..V -.--_->!

A..B V V CD.

Now propositions cither (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, com-
mensura and incomraensura are also heiera. Our knowledge of hetera and consequcitly cif homou depends ipon time and spacer but our knowledge of siwiilia, 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 And two or more instances of similical effects, and we use one of the instances to eliminate ^ome of the at^gregations from the sine quibus ncm in another instance. The agerega-tions of the two or more instances may be synchronous or they. may not be. An observation mode in the time of Homer, if correctly made, is as valuable for one of the instances, as one mad« 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 ©f an ob-

servation or experiment have homonical times. And when we view ametalic globe, for instance, of the diameter of six inches, we consider it as occupy-ing an homonical where, though the wheres of its particles be hetera. And 80 also, if we bring the aggregations A, B, C, D, &c., in contact with each other, we may then consider, the result as an aggi'egation of aggrega-tions and as occupying an homonical where. Now if we let the last letters of the Alphabet, v, x, y, z, stand for effects, and let the sign U stand for cau • sation, then in view of what has been said above, we will have the propositien,

(1.)

A A
T. S.

V V A A

T. 8. T. 8.

A..B..C..D. V V A'..B'..C'

n V V If

T. 8.

X II X'

And as x and x' are similical effects, they can be produced by similical hetera and in ord«r to have similical hetera bo nomine etin numero, we must dismiss D in the first term from the skie quibus noMOf the effect x. We may then find another instance «nd have the proposition :

^.i.

V V
T. S.

^.s'

A"..B"

V V

V V
T 8.

A'..B'..0'

n
X"

2^

x'

And this proposition enables us to hoterate C. The. heterical induc-
tion of gregaria may berepreseated in the same manner. Take the proposition

(2.)

A .. B

V V*
T.S.

A A

Y V
T. 8.

C .. B'

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

X

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

U

X'

9-

Now as B II B', they willcoatain a lik« number of Bimilical gregaria
and hence by looking at 0, d can be #liminated ft'om the causal grej^a-
lia in A.

Homonical induction is \he reverse of heterical indnclion. Tak« the
proposition respecting nggregal ions:

(3.)

A A V V A A

T. S. T. S. T. S.

V
T.

V

V

V

V
T

V

A..B..0 V V B'..C'

X ..H- 0, or y.

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 jjfrcgaria and ihen take the proposition :

(4.)

A A
T. S.

V V
T. S.

A A
T. 8.

A. .B

V V

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 grega-ria in A and O may be differentiated from the causal gr«|r44ria, 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. * '

lOr

\

(5,)-

A A
T. S.

^. 8. \

V V.

A A

T. 8. ,,

A.- .B

C. .B'

a..b..c..d L.k..&c.

a..b..c..f i..k..&c.

n

V ,v ■

T. g.

U

X

!l

I'

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

We must nf)tice, that in «ur pr.opositious for making heterical and homouical indudtieas, w« rejiresent the aggregations by the fiigns 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 ratioei 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 iji: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 heterical signs between the terms.

Im incommeusurl induction, there are three cases; Ist, times and spaces being commensura, the quantities are inoom measura ; 2d the times and quan-tities being comnaensura, 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.8.

. :* A%ft' '-" • ^••-

X., <

(7.)

A V
T.S.

= V < V
T, 8.

A V
T.S.

A..B

= V

V V

T.S.

>

A'..B'

X

,. x'

(8.)

< V = V

U.

T. S.

il

A.B

= V,

A\.B'

U
X.

V V
T.S.
<?

2^
X'

Commensural indaction brings a simile of one of the aggregationi, irhich we have determined by incommensural indaction to contain causal gregaria of a given effect, an^ some other aggregation, about which we are mncertain, into relations commensural with the relations between the aggregations, which we Icnow to contain causal gregaria-of such effects. And these relations are threeft>ld, hence :

(9.)

xrV - Y

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

A..B = V 0..B'

U V V 2f
— T. 8. —
X ...= X' t

Which proposition brings C and B' into commensural rejatlons with the relations of A and B, and when that is done we find the commensural offect, and hence, as B || B', we conclude that C contains similical gregaria witk A. If we should take the second term of proposition (8,) as the first tonn of an inductive commensural proposition we will have:

n

(9.)
= V = V

T. frT.

^.l

A'..B'

= V

V V
T. S.

0..B'

U

X'

X"

If we cannot thus bring the aggregations, which we are investigating, into commensural relations as above, and find oommensural effects, we may yet frequently, by mathematical calculations, find what would bt the effect, if such commensural relations were realized; and this will answer the purpose.

CHAPTER IIL

HKTBRICAL IVDUCTION APPLIED.

In the two previous chapters, we have given formulse, which, when carefully considered and fixed in the mind, will assist the understanding in investigating nature. Observations and experiments must furnish the data ^ut the Inferences to be drawn from those data must be dictated by a sound philosophy. And the formulse, which we have given, will sot 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. formulse, as the reader, who has mastered the sulyect, can easily do that for himself. We wish merely to show the utility and importance of the subject, by illustrations from cases in which tkese 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 - 8cientific 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. f. Substances whese particles are inter s© si m ilia. And from some or other of these elements, mineral compounds, vegetable organisms and animml organisations are produced. Now nature^s labratory can be entered, in the first instance, only by induction ; we cannot commence with the simple elements and reiwon a priori, or a posteriori, without first having made ind»

tloQS. 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 nuitiber 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 th« given effect ; although this false kind or reasoning per enuraerationem simplioem is still emplpyed by writers upon the physical scieices. ' ' ' *

In the organ ucHti^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 stomach, an unusual action. And although this life principle exists in all animals, yet the theory respecting ite /orce on the elements ft.nd it is nothing b«t 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 boilpd aibumien and muscular fibre can be dissolved by adding a few drops of muriatic acid to a decoction of tli« 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 principles in dissolving the food ; and if the known principles of chemical transformation do not yet sufficiently account for digestion, it must be further inquired imto. Physiologists have also attributed the formation of formic acid, oxalic acid, urea &c., in the body to the force of the vis vil8B; yet each of these can be formed in the labratqry 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.

Ohsni^istg hjave contende<il 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, althougii this butnim is present im most soils, yet "pliuats thrivCt" as we are informed by Dr. Lelbig, "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 'indifiterent' and most >imctoDge(kUe euhstaace known ; ft may be kept for centuries without ohange^ and is, therefore, not subject to decomp^nsition.^' Kow one suck case, as jiiet ciited from Dr. Leibig, who reasons more philosophically than most ohemistsy completely hetorates the absobption 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 tbil

carbonic acid is a sine qua non. Tbis, liowever, caonot be proved by heterical induction, which is the only subject tliat concerns us at present.

We find that several kinds of opium contain maconic acid, and fr^)m the examination of such kinds alone without a true philosopliy by which to test nature, we would erroneously conclude maconic acid to be a sine qua non of opium as an nnadyne and soporifi'^, but there are other specimens of opium, which do not contain a trace of this acid, and yet thfy produce similical etfecis. By heterical induction also, vve establish the truth, that volition and the mind's command of the nerv(»us 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 minds control, nutrition still proceeds 'wiihcmt interruption. Oxygen may be condensed into a liquid by pressure, in wliich state it posses those gregaria, which distinguish a liquid from a gass; and yet in either state its actions upon other substances are int^r se <«imilia; and those distinguishing gregaria some in the one and some in the other state, cun be heterated Irom the causal gregaria of the effects of ox3''gen. We need not illustrate further.

CHAHTEK 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 fespiration continues, the ci-i'culation of the blood and life and heat exist, but let respiration be prevented and denth ensues; by homcmical 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 earthj matters, carbonic acid and water can be removed from the causes of the effects of respiration by heterical induction; but if we remove the ox^'gen, these effects immediately ceai»e. and hence it is certain that oxygen is a sine qua noo. And by heterical induction we can remove all elements from the sioe quibus non of the growth of mammalia excepting those contained in milk; for the health and gniwtli ot 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 liydrogen; lactase of soda, phosphate of lime, common salt anl 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 ooe of the constituents of milk be wanting

for any great length of time without ;i marked influence upon the liealth of the animal. Experiments showing such truths furnish the data for homonical inductions. Plants Cannot grow it either hydrogen or Ci^rbonic acid be wanting, and hence, tiiese ar»^ sine quibus uon.

And ac^jxiu, we dee that if the blood be taken from animals, the imme diately die; that blood is a sine qua nou, is tlierefore evident. We see also by heierical 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 tlie one and f>f llift other ai'e, not only similical differentia, but also by weight commensural incommensura. It has been found also that if the blood be deprived of any one ot its constituents, the health sufters; each one, tlierefore, by homonical induction is a sine qua non. We can prove also by homonical induction that light is a sine qua non ol the growth and health of vee:etables; for, other things being equal, thfey will not develone in dark cellars or eaves. Most plants contain organic acids in ciombi nation 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 alkalino base is in sihe qua non f>f ^^jrox^th of plants. The way to prove it is to make an experiment artd have all other things, found in the soil and atmosphere where the plant grows well, present excepting these l)ases; if the plant will then not grow, we have made an honiodicHl induction.

In many of the sterile soils on the coast of South America, crops of grain will not gn>w at all: but if guano be put upon those soils, they then yield abundant crops; here is an homwnical induction respecting guano. And cenain 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 plHints, but if these be added, the plan^: then thrive upon them: here is an homonical induction. Homonical inducuious respecting the hecessary constituents of soils for raising plants may readily be made by compjiriflg a productive with a barren soil. We take the following analyses from Di*. Leibig's agricultural chemestry. A, represents the surface soil; and B the subsoil. One hundred parts contain :

A. B.

Siliea w ih C(,. ^e silicious sand 95,843. 95,180

,Alum.ina 0.600. 1,600

Prato :ide and peroi^Ide of iron 1,800. 2,200

Peroxide of manganese • a trace.'

Lime ih combination w ith silica i-r^-- 0,088. 0,455

Mngn: 3ia in tombination with silica. . . ; P'l^B^^. ^y.V^.PV o!(X)6. 0160

PotHSH and 8(^da QOQo 00^

IC

Phosphate of iron , ^C-l^^- '^•^^

Sulptiuric acid .♦. 0.002. a trace

Cloriue 0.006: -OOOl

Htimus soluable i(j alkalies .' : . . : . .. 1,000. 0.000

Humus insoluablc in alkalies . . .^ ,;,..*.,.. 050^. , 0.000

100,000. 100,000

Tlie above analysetl soil was cliaractised by its great sterility. Wliite clover could not l)e iuade to grow upon it; it, ilierefore furnisbes one of the cases necessary for an hnmonicar iiuiiuciion. In Iho 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

Ma^nesiiv ^ 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

7ue above soil produced luxuriant crops of lucerne and. sainfoin and all other plants whose roots penetrated deeply into the ground. Now from these two case.^, it would appear that in those plants receiving their novish-meut from the subsoil, humus was a sine qua non; while gypiium is indicated as a sine qna non. in the surface soil. . ,» , .

It wti lake duusoular fibriue, wlm.h contains water, and leX it \)e ex-posed to ;i moist atm(»sphere, putrifactjon takes pi ac^^i but if the,filirine, be dried and vben expicfsed lo a diy almogphere, no such result takes plac,j\ Hence water or hydrogen, is a sine qua non ot' tUfit putri faction, 8o,ralSiO yeast, wlwn completely diy, possesses, no power to procluce" feimentatjf/i]. Now yeasi possesses a soluble and an iuksolnbie 3iibstauc<3, -.^ndJh^, iiasoliihle substance may be th*-owa out of the fviue quibus Hon. of fcrmeptatiou ,jl)v iieterical induction; but the soluable 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 hermetricaJly sealed ves.sels witJUout undergotj^g the slightest chaiige, t)ut if exposed to the atmosphere fermentation immiediately begins. Hence the soluble part of yeast and the atmosphere, are proved to be sine quibuau/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; eaclK^f

Ihese/^herefo^e, is a sine qua dod 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 makmg and the uiility of homonical inductions. Any on^ of tlie cases of induction giyen above may be state^i in the manner of formulae (3), in Chapter II. The only difficulty in arriving at conclusions, which may be confidently relied upnn, lies in obtaining the precise, data needed; if these can be had our conclusions are infallible,

CHAPTER V.

DIPFEHENTIAL INDUCTION APPLIED.

We have seen in the previous book, that the homonical induction of aggregations only proves a certain aggregation to have bef^n a sine qua non of a particular eflfect, but from this case we can am. infer by ratiocination that this particular aggregation. or a simile of it must be a sine qua non of all similical effects. For, as there shown, two aggregaUoos, as aggregations may be differentia, and y:et in the respect of the LC'*egarium, which in one of the aggregations has been a ca^ise 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 diiierential induction, that those gregaria, which distinguish gasses from liquids and sttlids, are not the causal gregariaof the peculiar *action of any gass upon another substance; for,. in these distinguishing grcgaria gasses all agree. By differential induction we know, that the pectiliar action of oxygen upon iron, for instance, is not owing to the aistinguishing gregaria of a gass; 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 elem:ent8 would lay the foundations upon which chemestry might be made a deductive science; which may, as we hope, bo accomplished in the future. But for the illustration of our present subject, we must proceed with such data tts experimentalists have furnished. And we may commence, not with the differential Induction of elements, but of compounds. One element msy not exert sbme pecnlinr force without the. presence of another or others, witli

which it is compouneled, and then tl»is peculiar compound. is the sine qua non of a given effect. This is owing to the circumstance, Ihat compounds possess capacial gregaria, which, with reference to the gregaria ©f 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 eacli of the simpler compounds, into which a composite substance can be resolved, exerts its gregaria unimpeded 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; M^ilate of lime; Gallate of lime; Oxalate of lime; Sulphate of pottassa; Cloride 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 cloride of pottassium by a comparison with sea-AVater; the sulphate of pottassa by a- comparison with potashes; the oxaUite of lime by a comparison with wood-sorrel ; Gallate of lime by a comparison with jsjall-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 differ entiate 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 mprnhia, there-

fore, not by its ingredients, but by its gregaria. o

Now morphia- among othera coontains the following gregaria.

MoRPHTA-. — It is fusible at modeiate lu-af ; it burns with a red and very smokv liauui; 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 vvater; it is insoluble in ether; ii is iusoluble in oil; it is insoluble in chloroform; it forms salts with acids.

We will assume that ihe above data are correct, thouorh chemists dilfer respecting some of the grci^aria, Tne 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 alcohol ; it is insoluble in ether; it is insoluble in oil.

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

KESIN.—J[t 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 substances we will see that several ol their gregaria are inter se similia; these gregaria, therefore, may be differentiated from the poisonous gregaria contained in morphia, and further investigation must be had.

Again; we know that commo:i salt, cloride of sodium, is an antiseptic and when applied to fresh flesh it prevents decay; we may inquire therefore, rtispecting tho causal gregarium of this phenomenon. Now among the gregaria 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 liitlo in alcohol; it melts by heat; it is decomposed by carbonate of polai>.•^a.

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

Epsom Salts.— It has a white color, it lias a saline taste, it undergoes but little change in a dry atmosphere, it dissolves in water, it dissolves biU little in alcohol, it melts by heat, it is decompo:?ed by carbonate uf potassu.

Now the similia may be differentiated fl-om 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.

STMILICAL INDUCTION APPLIED.

As hcterical induction clears the way for homonical induction- s<^ differential induction prepares the way for similical induction. And both differential and similical inductions to be satisfactory must be based upon :i great number of gregaria, which requires a very extensive knowledge? 0^

substances.. We do not prnf)ose lo give complete and wholly satisfactory inductions respecting tlie can«al gregaria of etfects; for that would require a different kind of treatise from the one upon which we are now engaged, but we merely propose to illustrate the principles of induction and let scientific men, each one in his own special department, make the application with full data to particular subjects. Now if we wish to find the poisonous gregarium or gregaria contained in Muriatic or Sulphuric acid, we may examine their I icregaria in the following manner. Some of the gregaria of Muriatic acid are as follows: ' • ,

MuRi.\Tic Acid. — It is a colorless liquid, it has a sour tasle, it corrodes animal tissues, it is incompatable with metalic oxides, it is incompatable with alkalies, it redens litmu«i paper, it has a strong p.fflnity for water.

The following are some of the gregaria ot Sulphuric ^cjd:
■ SuLPHUiiic Acid.— It is a colorless liquid, it has a sour taste, it corrodes animal tissues, it is incompatable with metalic oxides, it is incompatable with alkalies, it redens 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 etfects. 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 incompatable with metalic oxides, il is incompatable with alkalies, it redens litmus paper, it has a strong afiinity 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, whicli do not corrode or immediately destro}' the orL':ans 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 witn animal tissues.

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

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

For purposes of differential induction we may'^Jifom^pare piffe indigo with the above:

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

After differentiating we find carbonate of lead and copper to agree in the gregarinm 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. Chetnists have not been familiar with the inductive processes and they have not looked fortlata 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 crystaline structure, its crystals are of the rhombohedral form, it is insoluble in water, it is soluble in acid, it is soluble iu alkali.

The following are some of the gregaria of Iceland spar, another suh-stance causing double refraction :

Iceland Spar.— It is a transparent substance, it is of crystaline 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 crystaline 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 crystaline structure, its crystals are of tlie 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 crystaline structure, its crystals are either of the cubical or octohedral form but sometimes prismatic, it is ijisoluble 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 crystaline structure, its crystals arc 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 upot rhombi^hedral

crystals. 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 aod 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 m©re certainly correct data. Fesnel 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 U 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 postekiort 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 similical induction.

CHAPTER VII.

INCOMMBNSURAL INDUCTION APPLIED.

We have seen, heretofore, that there are three cases sf 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 depedent upon the respiratiou of this gass. 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'^ temberature and vegetation. And in every branch of agriculture, horticulture and floral train lag, the case of incommensural inductions trom 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, ry« 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 th

Barvanan contained 24. per cent; Davy obtained 19. pwr 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 Boussiugault 17.3 per cent, of gluten; that of wheat grown in the *Jardin des Plantes' 26.7 and that of wnnter wheat .3.33 per cent. Such great differences must b« ow ing 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 alsct^ to a most remarkable difference in the proportion of the substances containing nitrogen, such as the glutea which they contain. ;ic * * * :ic Qqq hundred parts of wheat grown on a soil manured with cow-dung (a manure containing the smallest quantity of nitrogen) afforded only 11.95 parts of gluten and 64.34 parts of amylin or starch; wjiile Uie same quantity grown on a soil manured with human urine, yielded the maximum of gluten, namely 35.1 per cent. Putrified urine contains nitrogen in the forms of carbonate, phosphate and lactate of amtnonia and in no other form th^p that of ammonical salts." Now, in the above facts, granting the soils and atmospheres to have been in all other respects inter se similical and commensural, there is a fair incommensural induction respecting ammonia. In another case of incommensural inductioq, we have seen that, ceteris paribus, the spaces between an object containing causal gregariaaudthe incommensuj^al effects are incommeijsural ; and we w^ill now proceed to give a few simple illustrations of this case. It is said that Galil«o, 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 incommensura in different latitudes

and locaiities. A pendulum of about 39 inchesj which vibrates seconds iu the latitude of New York, will not vibrate sixty times in an hour of cornmensural 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 ©f 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 incommensrural relations of spaces between the earth and. the incommensural effects, that the earth contains causal gregaria of these phenomena. Again : The surve3'or,from the incommensural relations of spaces between his comimss and a c rtain hill and incommensural variations of the needle from the true meridian, concludes that the hill possesses causal gregaria of these variations. The incommensural 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 incommensural inductions; and although the tides, on the opposite side of the earth from the moon, might seem at first thought, to destroy the f«rceof these data, yet when

we reflect that the earth is interposed between the inoon and those tides, tli\B data remaiD in their validity. The reader will understand that in incommeasural induction from inOi)mmensural re>ation8 of space, we are seeking merely for some object which contains causal gregaria of the incommensural effects; no matter what may be the characters^ in other respects, of the incommensural effects in their relations inter se. Thus: if we try the positively 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 incommensural relations of space and the incommensural effects of each kind inter se, i. e., incommensural similia both these sets of plienomena, though inter se differentia, ajci^ proved to have a dependence upon the knob of the jar, i. e., the kueb contains causal gregaria of both these sets of phenomena.

We will now give a few illuitrations of the case in which incommensural inductions can be obtained from incommensural relations of times. If we should find find by tne 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 incommensural effects perceived in the ores, conclusive incommensural inductions of the cause from the incommensural relations of times, had we never thought of the cause before. For, granting that all other things are similical and commcn.sural in the two sets of phenomena excepting the times of exposure to the atmogphere, and the quantities of' atmosphere being commensura in commensural times/ no object whatever, excepting^the atmosphere could have iucommensurated the effects witnessed in the oxydized ores. A hound by instinct as we call it, makes a kind of inverse incommensural induction concerning incommensural effects from incommensural 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 commensural inter se, and which the atmosphere with the soil comences to diminish, leaving at incommensural intervals f»f time from the point from which they were made incommensural effects. When the hound, therefore, strikes a I'atJherold track, not having a scientific knowledgeofihe 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 timi?, although it may have lain down within forty rods fram 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 tlie 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^^ incomniensural 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 incpmmen- 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 eftects 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 eertain 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 simiiical 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 eur 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 a certain other and so on : and in all these experiments we will suppose the plates of the different metals and minerals with which we experimented to be quite thick and placed upon solid granite rock. The

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 tliis, we tind a mass of metal, of a kind unknown to us, underlain with granite and we let the same ivory ball fall upoa its smooth surface forty feet and observe its rebounding, and we find this effect to be commeusural with that obtained when it was let fall upon marble; then as the ball is the same and other things are equal, thecommen- sural relations of the spaces fallen through by the ball in the two cases to the ccjfmmensural effects, convince us by commonsural induction, that this new metal contains, in the respect to these similical and commensural eff'ects similical and commensural causal gregaria with those con tamed in marble.^ And. should this new metal be so situated that, we could not approach to it so as lo 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: it we now take a piece of are and situate the needle with weight attached on the same surface as before, and a commensural effect be produced, we conclude by commensural induc- tion, having our eye on the commensural relations of the spaces in th'e two cases and times being supposed commensural, that the magnet and ore eon- tain similical and commensural causal gregaria. Again ; if we make a fire in a stote 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 mer- cury will bethe quantum of the effects; if then #e go to a heap of quick lime Jwith water thrown upon it and covered up with earth, and we place the thermometer at a commensural distance from it and tind the quanta of effects t) be inter se commensural, we conclude that the heap contains similical and commensural gregaria, respecting such eft'ects, 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 w^e 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 i)aloon and the baloon then ascend a given distance in a certp'*- time, and we then attach the same weight to another commensural ba'

and the second one make the same distance in a commL^usural time, the Uvo baloons contain similical and commeDsqra gregaria.

Tliird 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 puss so as to ignite sulphuric ether and then we discharge a spark of the jar commensuraily 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 »ol 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 ot mathematical ratios. By taking a piece of iron, for instance, to incommensural distances from the earth's surface and finding the ratios of its weigiits 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 pioject a stone of a certain weight in a horizontal direction with a given velocity, tve can calculale tlie 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 confmmensural induction, that the moon and the stone contain similicnl causal gregaria. In thi.«< manner Newton extended gravity to the moon, and it has since been extended to other heavenly bpdies; and it is supposed, by induclio per enumerationem simplicem, to exist throughout the unTverse.

« CHAPTER IX.

THE DENOMINATE UNIT.

Those who have mastered the princii^les 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, ex cept 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 wo 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 aloae,

but upon similical and flifl'erential relations of gregaria; and if we can deal with these gregaria so as to discover the laws of causation by which they act, w« 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 quantitive 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, posses from a to b (Pig. !.)• in the small circlie 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

~ T

' in which relations the space from a to b may be made the denominate and homonical unit of meiisure; and if this unit will apply twice to the

space from c to d then 2

V=- = 2.
1
The space from a to b may be made also the homonical unit of measure for a steelyard, a barometer, a thermometer, steamguage, momentum, dry measure, liquid measure, money and throughout nature.

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

4. 5. 6.

1.

2.

3.

S

S

M

M

V = —
W

Vr=— -S = VT T = — W = — M = VW
T V V

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.

M

w'

S
T

MT SW MT e^W. ^j^.

W M S T T W

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 incomnfiensural 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:

13. 14. 15.

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 Y2T2G Qr2

G Q = V2T2:r: ^

V2T2 r2 G

19. 20. 21.

T

V = -\/^ S = RT\ /^ T=*-\/^

^ \/ G- \/ G V \/ 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, 1 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 8 for si)ecific gravity, and we will have the following equation :

30

G

22, S =

I

And if in equation 22 oquiil (I in ('(jualion U», and wc* aubsiitulf^ we will li'.ive: Qr2l

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

riiAPT^:ii X.

JIATIO.

U one of two numbers be made the numerator and the other denomi- . iiator of a common fraction, the ratio of the numerator to the denominator is such numV>er, that if you mnltipi^y the denominatoi* l)y it you will have the numerator, and if you divide the numerator by i«. yon will have the denominator : ajid the ratio of tlie 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, wlio have studied Uiathematics, will understand the following propositions:

() a a 00 (X

aXOrrO. — rrrO. — = QC. — z.-0. — = 1. -^= o5. — ::=:0. QCX0=1. aud — = 1.

a Q^ ^ ^

Tn these propositions zer<» 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 propositit^ns, excepting the last one, need any explanation for the mathematicians; the symbol

however, needs some explanaticm as the mathematical treatises used in our schools and colleges have not given to it its true significance, wliich we will now i)roceed to explain. Take the proposition

a-^— bs

a«— 1)2
If in this equation we make a~b, we will have

^0 *

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

31

(a--b) (a5+ab+b2)

Q X := X

(a-b) (a+b)
Now from this equation we may have

(a2+ab+b2) OXaS+oxab-f-Oxbs

4. x=— X = ^ =~=1 :

(a+b) fOXa+OXb)

Or we may have

(aH-ab+b2) (a24-ab+b«) 3a2 3a

K -y \/ 1 X — ^^

(a+b) (a+b) 2a 2*

How are those incommensural results to be explained? Kow as

— =1,

1 is the ratio of the numerator to the (denominator and also of the denominator to the numerator, as it alwa^^s is when the numerator and denominator are absolute!}^ commensura ; thus 4 8

— =1,— =1,— =1, etc.
4 8

And it is evident that in equation 4 we have taken the fraction

a2+ab+b2

a+b

and multiplied its numerator and denominator by the common inflnitesmal quantity a

c»

while in equation 5 we have multiplied the same fraction by the ratio of

a a
— to —

00 GO

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 denominate unit^ and it is also evident that, in all proper fractious the ratio of the numerator to the denominator will be less than the denominate unit: it is alao evident that the difference between }^ and }4 will be a greater quantity with reference to the denominate unit, than the difference between ^ and J^, while their ratios are commensura: thus }4~'~ M=K aud y8-^M=H and 1^=3^; but J^-;^=K and M-H^Vs 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 compared with the denominate unit; and hence the difference between the numerator and denominator may become inflnitesmal 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 inflnitesmal quantities in their relations to our minds. And if by we mean absolutely nothing at all, 0-r-O is nothing, 0—0 is nothing and 0X0 is nothing; and if by oo we mean Something without limit, oox <» 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 insommensural 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 commensura, 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 considered, but if a— b in the denominator be an infinitesmal quanity and a— b in the numerator be an absolutely commensural infinitesmal quantity,

a-b

a-b

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 homonical 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 nothiuj? will remain in the same relations, as when ii is multiplied by the ratio of two numbers, whose difference is absolutely nothin.£f; and therefore in equation 4 we multiplied both numerator and denominator by an infinitesmal quantity, which produced products whose difference was not absolutely nothing though taken to be so, while in equation 5 we multiplied by the ratio ©f two numbers, whose difference wasabsolutely nothing, and hence the ip^ommensural results. And upon the supposition with which westarted, i. e., that a was absolutely equal to b, equation 6 contains the true result.

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

^ 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 :^hus 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'^ —%{, or if we multiplv in, we will have 4X1 4

K= — - — H'^

4X3 8
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^

^ And hence the symbol —

is the ratio of infmi-
tesmiiis, and ff

Qo is its reciprocal ; and the ratio of these ratios is 1 ; thus

— ^ — =1 and — H- — =1,
00 00

i. e., the ratio of ratios, wliich are reciprocal, is always llie denominate unit; and hence the true significance of q^

— and —

"^ is ratio of reciprocal ratios.

If we take the ecjiiation a2— b-

6. x=

(a— b)~ and make a=b infinitesimally we

will have T. x= — =1;

but by factoring and canceHins: we will have

a+b a-iE> a+b 2a

a-b a-b a-b
N(»w if by we mean absolulely noihing then x=2a, and
X 2a 3a

— «=- . i. e., — will be the true ratio of x to 1 ; and if by we uican an in-
111 X 00 00

finilesmal quantity then x=«oo and — = — , i. e., — will be the true ratio ol x

111
to 1; but the two values of x are incommensura, i. e., in the first cas8 it is finite and inthcHecoud it is infinite: and we will have the proposition
9. X:l::QO;l, xXl=<^+lf=oo, A^^ain take the equation
^ (a-b)2

10. 3e*= and by making a=«b infinitesimally we will

a3-b3 1 3a'i

have 11. x==~, lliis last equation may be stated thus — ==t-

3a2 I «

1 8a2 3a

and if by we mean absolutely' nothing we will have — =='— , i. e., — will be

X 1 1

the true ratio of 1 to x, and if by we mean an infiuitesmal then x=0 and

1 1
we will have — ==— ; but the two values of x are incommensura, i. e., in llie

X
first case it i«i finite and in tne second it is infinilesmal: and we will hare

the- proportion X:1::0:1, xXl=OXl=0. And from the above we see

1 00 1

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 deiermine the ratio of ratios; for rate and ratio, when Jippb*^<^ to motion or increase, are the same thing. And' the ratio of (me con-^^"^

I

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 commensurai 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 [he ratio ot unity to twice the side ot the square." This is the enunciation of the Theorem as given by Prof. Loom is; as we cousider, however, that this enuncintion is incorrect and does not set out clearly the matter to be proven, we will give the following in its stead: The rale 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 ti»e unvaried square -|- the variation of the side. Let a.b. (Fig. 1.) be e Figure 1. f the side of ilie square a, I), c, d and a, and suppose

I 1 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=l)efgdcb, (hen h=increase of the

' ; sid(, and g=the corresponding increase of area.

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

a d g 1

and as g = the corresponding increase of area, its rate of increase will

K s IJ ff J»

be== — ; and the ratio of these rates will be ; = — .

1 1 1 g

Kow let x = ab— the side of the square abcda, and y = ae— the side of the square aefga; then y— x=h, and y2— x2=g, and consequently,
h y— X y— X 1 1

g y52-x'^ y-x y+x y+x
But v+X"2x+h, and therefore:

h 1

g 2x-t-h*
But as the value of g dopends upon the vahie of h, if we make h an infinitesimal (and we have seen in 2§ that the ratio of infinitesimals is the same as the ratif) of appreciable qnuaiities springing from them b}' multiplication) we will have:

1

12. — = .

2x+0
and hence for infinitesimal variations we have:

h:g: :l:2x. Digitized by GoOglc

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 under-

standing of ratio is important and as tlu; calculus treats specially of this subject, to set it upon clear and true foundations must be acceptable to every student. And from the ab«ve demonstraiion it will appear to ever}^ reflect iuic reader, that the ideas entertained by many teacliers of fhe calculus, that h-^ij; 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 *rct at the true ratio we must reduce h and g to infinitesimal quantities, so vhat 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 error^ous.

Again, take the Theorem: The rate of variation of the • dge 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 4- the product of the varied and unvaried edges -j- the square of the unvaried edge. Let ii = 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 y-x 1

g y3-x3 y2+yx+x2'

If within this equation y=:x to within less than any assignable dift'erence, h and g will become infinitesimals and we will have

1

14. — = :

3x2

and hence for infinitesimal variations, h:g: :l:3x2. Tf the edge be decreasing instead of increasing x>y and we will have

• — h X— y — h 1

15. — = , and when x=y — ~ — .

— g x3-y3 -g 3x2

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 Arithmetrical 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 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 successive minute:

h
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«i^i

S • Digitizecfb^H=il0pQie

and 1 =^ last terra, and h will be equal to bn, and 8= | | n, and her^ce:

I 2 J

li bn 21)

15. — = — . But l=a+(n—l)d, and hence;

S fa+l 1 a+l

I In

I 3 J

h 2b

If). — r= , and when n— 1

S 2a+(n-l)d
li b
17. — -- — , and if we reduce h and S to infinitesimalJi,
S a
b b
18. — = — : — , 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 Arilh-

1 a+(n-l)d "
metrical progressioii to the last term considered. If the reader does no
lull}- comprehend this and the following paragraplis, let him turn to some
mathematical work upon the subje:;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 matheijiatics we will have:
h bn bn(r— 1)

20. — rr = . But when n=l we will have

S arn— a a(r" — 1)

r-1
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 Arithmetrical 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-fll

I I "

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

28. — ^ rr ^ J

8 Ir— A 2(lr~A) Digitized by V^OOglC^

r— 1

37
We have gone far enough, perhaps, upon the subject of ratio.

CHAPTfiR Xr.

TKANSFOBM^TION OF PROPOHITIONS.

If we take the three distinct propositions:

A A A V ..'^. A A A A V A A A A A V A A

TSTSTS TST8TS TSTSTS

a < b c- < (t a -= fl

by uniting them into one we may have

A V A V A V
T S 1' S T 8

a < < b

c d

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

^l ^s_ ^

Tf we take the distinct propositions

A A A V A A A A A V A A A A A V / ,\
T S T 8 T S , T 8 T 8 T 8 T 8 T 8 T 8

4. , _, ,

a < b b=c a = cl

by uniting them into one we may have

A V A V

T 8 A V . T 8

5. T8 .

AJM ==< b| V
|c d|

And fnmi proposition 5 by writing the sign of incommensura under the terms we may have the propositions

aV aV aV aV av AV 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 w A'^ L''^ , AA A A , AA

TS A V T8 T8 AV T8 TS a^ TI"
9. TS , TS

a — b C = (J Digitized

by^OC^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

4<s^

«8

A V
TS

a+c = = b+d

12.

AV
TS

A V
T8

axe =:

AV
T8

bXd

and 13.

A V
T8

"l a

AV
TS

AV
TS

in^:

- z= I c d

If we have any number of incommensural propositions as the fullow-

AA
TS

A A
TS

14. TS —

a < b

we may derive from them

A

A V

TS

AA
TS

A V
TS

15.

16.

a+d

A < a+d

<

b

A V
TS

iXd

<

TS

A<

H

av

TS
HXd

H'

<

, etc.

AV
TS

17.

a

A

A A
TS

AV
TS

A< a

And if we have any number of incommensural propositions as the following:

^A

A A
T» AV TS

18. TS

a <r b

we may derive from them

A V

TS

A A
TS

TS

H

AA

TS aV

TS

TS

— etc.

A A

TS

19.

A \/

TS

a+b+c+d+e+f a<
< < <S

a+b+c+d+e+f
< < <

etc

By setting down aH the signs in our transformations, we are able to integjjate or resolve the complex propositions into tli«ir simple and primitive ones without any diflSculty; 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 merelj^ distinguish the quantities of similia, proposition 6 may be transformed i

4,v

S

A A
TS

^i

a+c II II b+d

< >

And ftnj comtueDsural or incommensural, or commensural incommensural, or incommeDsural commensural proposition may be transformed by striking out the si^ns of equality and inequality between the terms and inserting in their stead the sign of similia.

Now let the letters a, b, e, etc., stand for names, which distinguish similia and differentia and take the differential propositions

21.

TS TS TS

AV
TS

TS

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.

b
\V
TS

a
a'

By uniting we will have

AV
TS

H-ll

AV
TS

b
b'

or, 25.

AV
TS

a
b'

AV
TS

II K-

AV
TS

a'
b

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 AV Ay\ AA AV AA

TS TS TS TS TS TS

26. - — . By uniting them we have

a II a' a" II a'"

any

27.

A V

TS

A 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 oc cupies an homonical space: but the organs of vision and those of hearing occupy heierical spaces; and the sotfnd 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 ■

a
b

vv

a'
b'

But if we should transpose the terms of the first of propositions 28 and then unite it with itself we would have

30.

^S

n

^l

a
a'

aV

a

a'

Take the propositions

¥s ^^'^8 ^%
31.

a A ft

b

A

b *

And by uniting them we have

32.

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 complex ones and obtain all the varieties of propositions having the varieties of signs between the terms as set down in Chapter First ot this bo«k and to place the appropriate signs over the T's and S's, we ne«d 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 similiaare converted into differentia or vice versa; or, some commensura are converted into incomcomensura or vice ve 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 transformations of propositions, however, the heteration of space may have been made merely by the mind ; but if we suppose a, b, c, etc., lo be material

«1

objects and to have changed the relalions 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 homonical propositions into homonical homonical propositions, indeed, no

such change in the sif^ns of the S's is indicated^ nor could the heteration of space occur, were a, for instance, a material object and contemplated in its ditfeient menial relat.ons.

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 ettects sprivig from heterical causes. Let us suppose, therefore, a, b, c, etc., in tlie foregoinir complex propositions to be causes, and let us make a homon of lime 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 ^ 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 lei v stand for the sum, we will have

And if in this proposition we change V into \ between the terms we will h'lve

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 hetert. but each of which per se 18 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 l)d are differential difterentia 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

^8 n •

V

= v'

ange

V into \ between the terms we

AA

'Vs '^8

87.

A A A '^ A A

T 8 r 8 r 8

And if we change V into A between the terms we will have ail effect differing from both x and y, i. e., we will have

«l

AA AA AA
TS TS TS

Let us now take propositions 23 and go through all the transformations, which the reader will now readily understand

H

ii

4^

a

H-

b

^%

^l

n

a'

H-

b'

U

^fe

*^»

¥s

X

II

X

A A
TS

AA
TS

AA
TS

X

A

X

U

AA
TS

AV

TS

AA

TS

X

II

X

U

AV
TS

AV
TS

AV
TS

a
b'

11 H-

a'
b

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.

4a

n

AA
TS

A V
T8

A A

T8

a

'&

b

By heterating' space between objects of
lerms froui each other.

A A A V A A
TS T 8 T S

a' H- b'

We have now gohe far euou<^h upon the subject of Transform itions of Propositions to give the reader a tiiorough understanding of the matter, if he will study and use his own mind in working out upon a slate the various Iransformations 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 j.^reat .
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 oi nature is not exhibited, the author claims that he has made many valuable discoveries in physical science which muf^t 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 harrising circumstances and difficulties, and it cannot be expected to bo otherwise than that numerous errors and obscurities should appear ih it. These the reader will excuse, and when scientific men shall have investigated the work and expressed their opinion about it the author will he 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.

^';,f3tfi^-v.-. -^1'. „v^y---*

Jk^

I fl10*m3127Sfl

_£ jfif*a v7ifm:Pt i^