

Chapter II. The Categories.

Art. 4. Theory rests upon the resemblances between different problems. The things with which a ~~practical~~ problem are concerned are always very numerous and are connected together in complicated ways. But we analyze those connections. If we have to consider ~~the~~ a commercial community, for example, we say, after all we have here merely pairs of parties who make contracts with one another which they either execute or fail to execute. For each contract, there is generally a pair of parties; and the whole intricate relationship between members of the community is merely an aggregate of ^{proposals to} contracts and of the behaviour of the parties in regard to these proposals and their consequences. The whole ~~theoretical~~ ^{of reasoning} about problems depends upon such analysis of them.

Art. 5. How far can such analysis be carried? The first truth about reasoning is, that any ^{system of connections} relationship between more than three things can be analyzed into ^{an aggregate} connections between three things or fewer. Let us suppose, for example, that A contracts with B to give C to D ^{within ten days after} as soon as E has given F to G. This may be analyzed into connections between triads as follows. A makes with B a contract, P. The first triad consists of A, B, and P. The contract, P, is the A shall act according to a certain rule, Q. The second triad consists of A, P, and Q. The rule Q is to perform a certain act R, upon a certain ^{occasion,} ~~contingency~~ S. The third triad is ^{consists of} between Q, R, and S.

The act R is the giving of C to D. The fourth triad consists of R, C, and D. The occasion, S, is ten days after E has made a certain transfer, T. The fifth triad consists of S, E, and T. The transfer T is of E to G. The sixth triad consists of T, E, and G. In this analysis one more triad than was necessary has been introduced, merely for the avoidance of an awkwardness of language.

Such an analysis can always be made. Any fact concerning a number of objects can ^{be equivalent to} result from a complex fact concerning those objects together with other fictive objects, ^{or facts,} this complex fact involving nothing ~~more~~ element more complex than a triadic fact. That is to say, let A, B, C, D, E, etc. be certain objects of which something is stated. Then, certain fictive objects, ^{or facts} P, Q, R, etc. being created, something ^{can} may be stated concerning A, B, C, D, E, etc together with P, Q, R, etc. which shall not itself ^{directly} concern more than three objects or facts, ^{shall} nor any of the facts ^{to} concerning which it may directly or indirectly relate ~~directly~~ concern more than three objects or facts, and this complex fact shall imply ^{The truth of the} that A, B given fact concerning A, B, C, D, E, etc., and shall imply nothing ~~more~~ concerning them, independently of P, Q, R, etc, more than is implied in that given fact.

For let us take the first and the last of the series of objects A, B, C, D, E, etc. one range in a row between them

a row of fictive objects, ~~one~~ ^{three less} in number than all the objects A, B, C, D, E, etc. Then ~~these~~ ~~row of fictive objects~~ with A at their head and the last of the objects A, B, C, D, E, etc. at the tail, will form a row one more in number than the remaining objects B, C, D, E, etc. Next insert these remaining objects, singly between the first and second, the second and third, etc. of the objects of the row A, P, Q, R, etc. We thus get the row ABPCQDRE etc. We now make ^{successive} statements concerning ^{first} A, B, and A, B, P; second PCQ; third, QDR, etc. Thus each of the objects A, B, C, D, E, etc. is mentioned ^{but once}, and each of the objects P, Q, R, etc. ^{only once}. Thus, not only are all these statements triadic, but in their combination there is ^{nothing} ~~nothing~~ ^{more complex}. The given fact about A, B, C, D, E, etc. is that there is a certain description of fact in which A takes the first place, B the second, C, the third etc. Let the statement about A, B, P be that there is this same description of fact in which A takes the first place, B the second, while the rest of the places are such as are ^{indicated by P} ~~set~~. The statement about P, C, Q is to be that P indicates that C takes the third place while the rest of the places are ^{taken} ~~as~~ indicated by Q. The statement about Q, D, R is that Q indicates that D takes the fourth place while the rest of the places are ^{taken} ~~as~~ indicated by R, etc. Thus, ^{the combination} ~~none of these~~ of all these statements will ~~be~~ amount precisely to the statement that in the given description of fact A, B, C, D, E, etc. take the first, second, third, fourth, fifth, etc. places.

Art. 6. Having thus found that every assertion about systems of more than three ~~of~~ subjects can be reduced to triadic assertions at most, ~~the~~ ^{are the} question arises ~~what is the~~ smallest sets that must be considered. I undertake to show that there are triadic facts which cannot be so stated as to involve only dyadic facts.

Suppose there be a ^{triad of a} certain sort of triad of which A is the first object, B the second, and C the third. If this can be dyadically stated, it will either be without such pronominal letters, as the P, Q, R, etc. of the last article, or by their aid. To state the fact without these letters, it would be necessary that it should be expressible in statements about the three pairs AB, BC, CA. An example will suffice to show that this is not always possible. Thus, that A gives B to C is not stated in saying that A gives away B, that A makes a gift to C, and that B is given to C. For these three statements together do not say that they are all true of one ^{and} the same act, which is precisely ^{wherein} what the triadic character lies. Next, introduce a pronominal letter. We may say: there is a triad, P, of which A is the first member; B is the second member of P; and C is the third member of P. But this is stating three ^{different} facts about one subject. This is precisely the same as stating of three ~~three~~ facts, as so many subjects, the one fact that they all belong to P. It is thus, merely ^{the} triadic fact inverted, or turned inside out. ~~To state~~ ^{three facts}

about one subject is ^{one} fact about three subjects. Nor could anything possibly be gained by multiplying the pronominal letters. For unless a letter were used three times, it could only ~~be~~ means of dyadic facts connect two subjects; and they might just as well be connected without it. Hence, neither with nor without pronominal letters can a triadic fact be stated in dyadic terms, unless owing to some peculiarity. A is the father and B the mother of the legitimate child C, is an example of such a peculiar triad. It is equivalent to A is the father of C, B is the mother of C, A is the husband of B.

Art. 7. The above two propositions are of the first importance in philosophy. The first has seldom been called in question; but the second has been expressly disputed, and ~~still~~ very often has been virtually disputed. That is to say, there have been attempts to ^{express} ~~explain~~ dyadically ^{conceptions} facts which ^{become} ~~are~~ manifestly triadic, as soon as the existence of triadic facts is admitted.

The whole endeavor to deny the irreducibility of triadic facts may be termed Nominalism. Strictly speaking, what the nominalists deny is the ^{real} existence of anything general; that is, of anything which wholly resides in, or applied to ~~is~~ many different things. For instance, they admit that this or that individual man exists, or has lived, Napoleon, Washington, etc.; but they deny there really is in nature any

genus homo. This is an old example; but it is no longer a good one, since evolution has taught us that a race of animals is, in point of fact, an ~~individual~~ thing. It is better to take a chemical substance. The nominalists admit that different pieces of gold appear on comparison alike; but they deny that there is any such thing as gold, in general. They admit that the earth attracts, or has uniformly attracted hitherto, all matter proportionally to its mass. But they deny that there really exists any general law by which it does so, and insist that it is a mere uniformity. That one thing appears like another to the mind they allow. This is a ^{tragic} ~~triple~~ fact, because there are the two like things and the mind. But they say, this is ~~the~~ ^{the} figment ~~product~~ of the mind. In ~~the~~ ^{real} existence, the two things are alike, but there is no idea in which they are alike. So that the earth attracts a body some of them admit; and to our comparing mind there is a formula which fits the case. But they say that that formula is a mere figment of the mind; in nature there is nothing but the two attracting bodies, ^{there is in nature} ~~and no real~~ no law or reason by virtue of which they attract. The Realists ^{are those who} maintain that the law is as real, or even more so, than the individual things.

Those who embrace ^{the} ~~that~~ nominalistic opinion about generals hold analogous opinions about ~~the~~ sundry other

tradic facts; and their position would be quite as strong, and their arguments equally applicable, if they were at once to say that there are in ^{the real} ~~natural world~~ no tradic facts at all; and some of them do so. This may be called thorough going nominalism. The writer of this is an extreme realist.

The nominalists appeal to a maxim called, after their most famous leader, Ockham's razor. It runs, Entia non sunt multiplicanda praeter necessitatem. That is to say, no elements should be admitted into a theory of a kind which there is no independent reason for accepting, if ~~it~~ ^{it} can be ^{avoided} omitted. There is nothing specially nominalistic about this maxim; it must be ~~ad~~ granted to be sound logic. Moreover, the nominalists pursue the only true scientific method in provisionally ~~accepting~~ ^{adopting} the theory which involves the fewest elements, and in adhering to it until it is positively disproved. But the realists insist that ~~it~~ ^{the nominalistic theory} is disproved, in the main.

Pythagoras seems to have been more than realistic; since he held that numbers higher than three are significant in philosophy. Plato was a realist; Aristotle was upon the borders between the two opinions. The Stoic and Epicurean sects in which ancient philosophy came to maturity were nominalistic. Medieval philosophy in its great period was ~~nominal~~ ^{realistic}. Nominalism came into vogue in the fourteenth century; and in the

the 14th century saw a revival of the subject

fifteenth, when thought was at a low ebb, became universal. It remained almost undisputed until well into the nineteenth century. Hegel developed the ~~seeds~~ seeds of realism lying dormant in Kant's system. At present, nominalism seems to be fast disappearing, being opposed by those who are guided in philosophy by ideas gathered in physical laboratories. It lingers among theological minds of the sceptical variety.

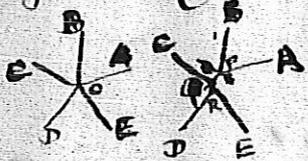
Chapter II. The Categories.

Art. 4. A triad is something more than a congeries of pairs. For example, A gives B to C. Here are three pairs: A parts with B, C receives B, A enriches C. But these three dual facts taken together do not make up the triple fact, which consist in this that A parts with B, C receives B, A enriches C, all in one act. Take another illustration. There is a two-way mode of freedom of a parti-



cle on a line from A to B. But if there is a furcation of the line, so that it leads from A to B and C and from B to A and C, there is an essentially different feature. Thus, in triads we must expect to find peculiarities of which pairs give no hint.

Art. 5. Systems of more than three objects ^{may be analyzed into} are mere congeries of triads. Thus, if a line branches from O five ways, so as to run separately to A, B, C, D, E; this result may be attained by supposing that at P there is a three-way node, ^{two of} of whose branches



run to A and B, while the third, infinitely short, runs to Q. At Q there is a three-way node, one of whose branches runs to C, ^{while} the other two, infinitely short, run to P and R. At R there is a three-way node, ^{two} of whose branches run to D and E, while the third, infinitely short, runs to Q. Thus, when the idea of branching three-ways is attained, we have all that is necessary

~~To produce all higher orders of branching.~~

Art. 8. The two principles contained in the last two articles explain a very important fact which has been ~~observed~~ ^{remarked} in philosophical analyses, namely, that a given sort of phenomenon or ~~case~~ ^{making} very general kind, usually appears under three essentially different modifications according as it belongs to single objects, pairs, or triads, but presents nothing essentially new when carried to higher systems.

It will, at any rate, be found a most helpful maxim, in making philosophical analyses to ^{consider} look first, at single objects, then at pairs, last triads.

We have already applied this maxim in Article I, where Cunning is that skill that resides only in the single person, Wisdom is that which can be stated to others, Theory is that which can be fortified by means (observed that a means, or medium, is a third) of a reason.

Art. 9. The above maxim crystallizes itself in the statement that there are three grand elementary formal ideas, as follows:

I. The First, or Original, expressed by the root AR. The plough goes first.

II. The Second, or Opponent expressed by the root AN, ^{as in} ~~Latin in~~, our other, and also more strongly, but with an idea of success in opposition, ~~this involves the idea of mastery, or success in opposition, as in~~ ~~AR, whence ob, apt, opus, opes, optimus, copy.~~ ~~appear to be in opes and optimus.~~

III. The Third, or Branching, ^{or Mediation} expressed by such roots as PAR, TAR,

MA. These three ideas may be called the Categories.

Art. 10. It is very useful in philosophizing to be ^{already} familiar with some of the principal disguised of the categories. We will glance at a few of them.

The idea of First is predominant in the ideas of freshness, life, freedom. The free is that which has not another behind it, determining its actions; but so far as the idea of the negation of another enters, the idea of another enters; and such negative idea must be put in the background, or else we cannot say that the Firstness is predominant. Freedom can only manifest itself in unlimited and uncontrolled variety and multiplicity; and thus the First becomes predominant in the ideas of measureless variety and multiplicity. It is the leading idea of Kant's "manifold of sense". But ⁱⁿ Kant's synthetic unity, the idea of thirdness is predominant. It is an attained unity; and would better have been called Totality; for that is the one of his categories ⁱⁿ which it finds a home. In the idea of Being, Firstness is predominant, not necessarily on account of the abstractness of that idea, but on account of its self-containedness. It is not in being separated from qualities that firstness is most predominant, but in being something peculiar and idiosyncratic. The First is predominant in feeling, as distinct from objective perception, will, and thought.

The idea of Second is predominant in the ideas of causation and of statical force. For cause and effect are two; and statical forces always ~~are~~ occur between pairs. Constraint

is a Secondness. In the flow of time in the mind, the past appears to act directly upon the future, its effect being called Memory, while the future only acts upon the past through the medium of Thirds. ~~How~~ Phenomena of this sort in the outward world shall be considered below. In Sense and Will there are reactions of Secondness between the ego and the non-ego (which non-ego may be an object of direct consciousness.) In will, the events leading up to the act are internal, and we say that we are agents more than patients. In sense, the antecedent events are not within us; and besides, the object of which we form a perception (though not that which immediately acts upon the nerves) remains unaffected. Consequently, we say that we are Patients, not Agents. In the idea of Reality, Secondness is predominant; for the real is that which insists upon forcing its way to recognition as something other than the mind's creation. (Remember that before the French word, second, was adopted into our language, other was merely the ordinal numeral corresponding to two.) The real is active: we acknowledge it, in calling it the actual. (This word is due to Aristotle's use of ἐνεργεια, action, to mean existence, as opposed to ^{mere} germinal state.) Again, the kind of thought of those ^{dualistic} philosophers who are fond of laying down propositions as if there were only two alternatives, and no gradual shading off between them, as when they say that in trying to find a law in a phenomenon, I commit myself to the proposition, that law bears

absolute sway in nature, such thought is marked by Secondness.

The ideas in which Thirdness is predominant are, ^{as might be expected} naturally more complicated, and mostly require ~~careful analysis~~ to be clearly apprehended; for ordinary, unenergetic thought slurs over this element as too difficult. There is all the more need of examining some of these ideas.

The easiest of those which are of philosophical interest is the idea of a sign, or representation. A sign stands for something to the idea which it ^{produces, or modifies,} ~~modifies,~~ or ^{is a vehicle} conveys. Or, it ~~conveys~~ ^{for} conveying into the mind something from without. That ^{for} which it stands is called its Object; that which it conveys, its Meaning; and the idea to which it gives rise, its Interpretant. The object of a representation can be nothing but a representation of which the first representation is the interpretant. But an endless series of representations each representing the one behind it may be conceived to have an absolute object at its limit. The meaning of a representation can be nothing but a representation. In fact, it is nothing but the representation itself conceived as stripped of irrelevant ~~material~~ clothing. But this clothing never can be completely stripped off; it is only changed for something more diaphanous. So there is an infinite regression here, too. Finally, the interpretant is nothing but another ^{representation} ~~idea~~ to which the torch of truth is handed along; and as representation, it has its interpretant again. ~~Thus,~~ another infinite series.

Art. 5. Division 4. The philosophical categories are

1. First.
2. Second.
3. Third.

Definition 5. The category of first is the conception of an object in its being, ~~as~~ not ^{as} having anything behind it.

Definition 6. The category of second is the conception of an object in its relation to another, in reaction with which its character lies.

Definition 7. The category of third, is the conception of an object as medium between two others which it brings into connection with each other.

Art. 6. Illustration 1. Philosophy is a science of facts: its data are the general phenomena of experience. One of these data is that the ideas of first, second, third, are perpetually occurring together and so as to form a complete set. ~~A fact~~ A high esteem for triads among many communities. Every such triad is an express recognition of a special worth in the ideas of first, second, third. Thus, as an anthropological fact, these ideas naturally tend to take a high place in the human mind. This, by itself, gives them importance. But further, those ideas to which the human mind naturally ascribes a high place have, with few exceptions, turned out to be of real importance.

Art. 7. Division 6. Phenomena are of three kinds according as their main characteristics come under the conceptions of First, Second, or Third, as follows:

First, the appearance may concern a single object. Thus, ^{the} a leaf of a tree may be considered as having ~~of~~ a certain shape, color, and texture, in itself. Such facts are Qualities, an object conceived as characterized by them is a Quale, and the conception of an object as a quale is called a First Intention.

Second, the appearance may concern pairs of objects. Thus, the color of a leaf depends upon the reaction between the luminiferous ether and the ponderable matter. All physical forces exist between pairs of particles: this is the law of action and reaction. A physical system of more than two objects is a mere ~~copy~~ aggregate of pairs. Such a fact may be called a Reaction, and an object characterized by a reaction may be called a Reagent.

Third, the appearance may concern triads of objects. Thus, a leaf as evidence of the qualities of the wood of the tree brings certain information to the botanist, it causes the quality of the wood to act upon the mind of the botanist. Since physical force is always between pairs, an influence of this triadic type, not resolvable into a mere aggregate of reactions, can only be intellectual in its nature. ~~A thing~~ The fact of causing one thing to be brought into intellectual relation to another is Repre-

The act, R, consists in giving C to D. The fourth triad consists of R, C, and D. The ^{occasion} ~~contingency~~, S, is ~~that the time immediately~~ ^{ten days after} for E has made a transfer, T. The fifth triad consists of S, E, and T. The transfer, T, is the giving of E to G. The sixth triad consists of T, E, and G. This analysis introduces one more triad than is necessary.

Such analysis can always be made. For if A, B, C, D, etc. are the objects connected, we have only to create another series of objects, P, Q, R, S, etc., which can be imaginary or merely letters written down, but which are subject to these ^{following} rules: A and B ~~have~~ are connected with P ~~in a way in which they would not be connected with it in definite ways~~ with P, C in definite ways with P and Q, D in definite ways with Q and R, etc., and these connections would not exist unless A, B, C, D, etc. were connected together in the manner in which they are connected.

Art. 6. To complete the truth about the most complete analysis possible, we must add to the above proposition the following: ~~The~~ A fact concerning three objects ^{is not} ~~cannot~~ always be ^{concerning} ~~equivalent~~ to any aggregate of ~~combined~~ facts each about two objects. For example, the fact that A gives B to C is not the same as the sum of the three facts that A parts with B, C receives B, A enriches C; for it not only implies that these three things are true, but also that these three ~~things are~~ ^{facts} statements are made true by one and the same act.

The act R is the giving of C to D. The fourth triad consists of R, C, and D. The occasion, S, is ten days after ~~it has made~~ a transfer, T. The fifth triad consists of S, E, and T. The transfer, T, is the giving of E to G. The sixth triad consists of T, E, and G. This analysis introduces one triad more than was necessary, for the sake of ^{the} simplification of language.

Such an analysis always can be made. That is to say, if A, B, C, D, E, etc are any number of objects greater than three ~~in any way~~ ^{in any given way,} connected, we can ~~instead~~ create imaginary objects such that, ^{the supposition that each} ~~through~~ no object is immediately connected with ^{not} more than two ^{others, results in} objects, yet the objects A, B, C, D, E, etc. ^{being} ~~are~~ connected with one another in the given way.

Sept. 6. Having, thus, found that analysis renders the ^{separate} ~~exam~~ examination of facts about sets of objects ~~more in number than~~ three unnecessary, the question arises what ^{are} the smallest sets that must be considered. I undertake to show that there are triadic facts which cannot be so stated as to involve only dual facts.

Suppose there is a certain ^{sort of} triadic system triad in which the first place is occupied by A, the second by B, and the third by C. If that is to be stated by ~~double~~ facts about pairs, it will either be without introducing a ^{letter of} pronominal effect, or with such a letter. Without it, we can only state that A and B make one sort of pair, A and C ~~a~~ sort another sort of pair, B and C a third. In certain special cases, that may suffice; ^{for example, if} ~~as~~ of the triple fact were that A and B were both older than C, it would be sufficient to say A is older than C, and B is older than C. Again, if A is the legitimate child of B and C, this is equivalent to saying A is a child of B, A is a child of C, B is ~~the~~ ^{named} to C. But in other cases, the triple fact could evidently not be so expressed. For example, if the ~~the~~ ^{the} triple ^{fact} is, that A gives B to C, this is not expressed by saying that A parts with B, that C receives B, and that A enriches C; because the triple fact implies that these three facts take place in one act. Let us next consider the case in which a pronominal letter is introduced. ~~Now~~ The fact that in a triad of a certain sort A is first, B second, C third, may ^{of course} ~~undoubtedly~~ be expressed by saying

that P is a triad in which A is first, P is a triad in which B is second, and P is a triad in which C is third. Thus to say that A gives B to C is the same as to say that there is a gift, ^{giving P,} of which A is the giver, that in P, B is the gift, and in P, C is the recipient. But ^{a fact composed of} ~~to say~~ ^{facts} three things about the same thing is in itself a triple fact. ~~It is a fact composed.~~ ^{Neither would anything} ~~be gained by additional pronominal letters, as for example, to say~~ ^{Neither would it} ~~answer the purpose to say~~ that in P, the giver is A, in Q the gift is B, in R the recipient is C, and that P and Q are the same, ^{is the same as S, S is the} same as Q, R is the same as T, and S the same as T, ~~and Q and R are the same. For Q would have three facts stated~~ of it.

It is thus plain that a ^{triadic} triple fact cannot be expressed in terms of ^{dyadic} dyadic facts.

Some of the ideas of prominent Thirdness which require closer study, preliminary to philosophy, are Continuity, Diffusion, Growth, and Intelligence.

Art. 11. Let us examine the idea of continuity, ^(the most difficult, the most important, the most subtle, the study of all philosophical ideas.) We say that time flows on in an unbroken stream; ⁱⁿ what does the unbrokenness of time and space consist ~~in~~? Let us confine ourselves to one dimension; for the continuity of a line is complete, and other dimensions only render the idea of continuity more difficult to extricate.

In time, or in the description of a line, there is a succession. But succession might exist without continuity. There is a succession in the rows of poplar trees on a French road. Each poplar tree has ^{others} another after it. Before and after are evidently dyadic relations. But the idea of next after refers in a negative way to a third; it denies that there is any third after the first and before the second. Moreover, when we say that after every ^{object of the} ~~one~~ ^{term} of series there is an object, we give Thirdness a different kind of prominence from what it has when we say that some object that comes after another has a third after it. The latter kind of thirdness is degenerate, it is a mere compound of two pairs; but the ~~the~~ former kind permeates the whole series with thirdness, and denies any last, or ~~strip~~ second extremity. Thus, the idea of an endless row of discrete objects,

which is the image of the system of whole numbers, ~~but~~ contains the idea of Thirdness ~~with~~ in considerable prominence.

But there is no instant of time next after another instant. Between any two instants there is a ^{The great philosophical analyst} third. Kant took this to be a satisfactory analysis of continuity. But it is not so. As an instance of such a series, we may take all the quantities capable of exact expression in decimals between 0 and 1, exclusive. * These numbers are supposed to be arranged in the order of their values, the larger after the smallest. There is no ^{first} greatest. The series is without a first and without a last; and between any two there are ~~more~~ others. But if we reverse ^{the order of} the figures which express each of these numbers, and take away the decimal point, so that, for example .461 becomes 146, we get for each of these numbers a distinct whole number; and arranging them in the order of these whole numbers, each one has another next after it. This cannot be done with a continuous series.

But the character which most ^{manifestly} ~~clearly~~ distinguishes such a series from a continuous series, is that it does not contain the limit of every ~~partial~~ endless series that forms a part of it. For example, take the following series of numbers,

* We often hear the words inclusive and exclusive, used as here pronounced like the adjectives. They are Latin adverbs, and should be pronounced inklyu'si'vee and eksklyu'si'vee.

.1
 .11
 .111
 .1111
 etc.

This is the series of numbers written entirely with ones, beginning in the tens-place and each continuing one place further ^{to the right} than the ^{number} ~~one~~ which went ^{next} before. Take also the following series

.2
 .12
 .112
 .1112
 etc.

This is the series of numbers ^{each} written with ^{one} a 2 in a decimal place and all with all the preceding places of decimals filled with ones, ^{the two} each in each being one place further to the right than in the number which next preceded. All of ~~these~~ numbers in these two series belong to the series of the last paragraph. The former of the two continually advances while the latter continually recedes in the great series. ^{Every} ~~All the~~ numbers of the latter series ^{of the two} come in the great series after every number of the former series of the two. Yet there is no number of the great series after every one of the former and before every one of the latter.

In a continuous series, this would not be so, there would

be the number $\frac{1}{9}$, ~~be~~ intermediate between the two. Imagine that on a line two particles move toward one another. Whether they move by leaps or run along the line makes no difference. But suppose that as they approach they move slower and slower. Now if there be no points between them that ^{neither} one or the other will ever attain or pass by, then they certainly must pass one another, if they move on forever. This is manifest. Yet ~~on that~~ ^{these two} series of numbers one increasing, the other decreasing, have between them no number of the great series that one or the other will not pass, and yet they never come together. There is precisely wherein that series is not continuous. between 0 and 1

If in place of numbers exactly expressible in decimals, we consider all the numbers between those limits which differ from one another in some place of decimals or other, although they may have significant figures further to the right than any assignable point, then we find that, if they do not form a continuous series, they, at least, have the above property of continuity. For this series, for example, would include the number which has a 1 in every place of decimals. This number would be greater than every one of the former of the two series and less than every one of the latter.

If the reader turns this ^{supposed series} matter over in his mind, he will find it full of logical pitfalls. For instance, he might say, between any two numbers exactly expressible in decimals

Art. 11. In inference we are led to one belief from considering others already accepted. The first step of inference usually consists in bringing together certain propositions which we believe to be true, but which, ^{supposing the inference to be a new one.} we have ~~not~~ hitherto not considered together, or, at least, have not united in the same way. This step is called colligation. A proposition which asserts, at once, two or more facts which might have been separately asserted in so many distinct propositions is called a conjunctive proposition. Many logicians refuse the name of reasoning to an inferential process of which a colligation forms no part. Such ~~is~~ inference they call immediate reasoning inference, and declare that it is of ~~the~~ ^{so} low an order that it ought not to be called by the same name as reasoning involving colligation. The present writer, while admitting that colligation ~~is~~ makes a great difference in the value of reasoning, yet thinks the main distinction is between inferences which are unconscious, and ^{appeared} so ~~a~~ mere inexplicable inabilities to think otherwise, and conscious inferences to which we give a deliberate and free approval. As an example of uncontrollable inference, ~~the~~ a celebrated philosopheme of Descartes may be mentioned. This metaphysician after declaring that he began his philosophy by doubting everything that could be doubted, goes on to say that he noticed that there was one thing that he could not

doubt, namely, he could not doubt that he did doubt. Now to doubt, he says, is to think; and from the ^{judgment: I think,} ~~fact that~~ ^{he then} inferred: I am. This is his Je pense: donc je suis. In one of his letters in which he carefully expounds his meaning, he says I do not mean to reason this way,

Whatever thinks exists,
I think,
Therefore, I exist.

For, say he, the proposition "whatever thinks exists" might be doubted. But what I mean is that when I think that I think, I cannot help immediately thinking that I exist. Very well, if he cannot help it, it is idle to ask whether it is reasoning to be approved of or not; ^{if it} ~~it~~ cannot be helped, that is the end of discussion. Now, whether this would be good reasoning if it were freely and deliberately embraced or not, as long as it is ^{merely} forced upon the mind, it knows not why or how, it is no reasoning at all, but blind instinct. Perhaps, ~~instinct is as safe as~~ ^{the rule of} instinct is salutary; but whether it is or not is not a practical question, as long as it cannot be thrown off. Some religious philosophers declare that men only half-exist, and that nothing fully exists but God, who, if he thinks at all, certainly does not do the kind of thinking Descartes meant, that is he does not doubt. These philosophers seem, therefore, somewhere ~~not~~ to

reject ~~from~~ the inference Descartes draws; and all he can reply is, "for my part, I cannot help believing so."

Far from feeling a reasoning deliberate and controlled to ~~be~~ forced ~~upon~~ itself upon us, by blind compulsion, we seem to see that the conclusion is true. If we say it must be so, this ~~is~~ ^{is} not ~~because~~ we feel ^{ourselves} compelled, but that we seem to see that the fact is compelled to be so. We have a distinct sense of freedom in the act.

We reach the conclusion by an act of observation exercised upon the icon, or image, in the mind, which represents the colligated premises. Between the parts of that image we come to recognize some relation not stated in the premises, and this we express to ourselves in the judgment we infer. For example, when we think that Enoch is a man, we may picture to ourselves the whole human race assembled together, with a great finger pointed at one not very sharply outlined individual whom we conceive to be Enoch. When we colligate to that judgment the judgment that all men are mortal we may conceive a line to be drawn round that assemblage, in such a way as to leave room for a great deal besides within it; and everything within that line we may imagine to have a shade of mortality over it. Contemplating this compound icon, we remark that Enoch has the same shade of mortality upon him. Perhaps ^{the icon} this has been for some time before our eyes without our remarking this special feature of it. There are various ways in which the reasoner may be led to remark such a feature. He may, for instance, say "Enoch

is a man, and every man is mortal," ~~then~~ and then, putting out of view the special nature of being a man, may think "Enoch is something that is mortal," and finally, simplifying form of thought, "Enoch is mortal."

As there are various ways of thinking a judgment, so there are various ways in which an inference may be suggested. Logic, as the art of reasoning, ought, at least, to find out the most convenient of these; but for the present it may suffice that ~~the~~ attention becomes fastened upon a special feature of the icon, and the rest are dropped from attention. In logic, we avoid the difficulties of psychology as much as possible by treating of ^{propositions} judgments in place of judgments, and to some extent of argumentations in place of reasonings.

Art. 12.

his powers of observation and so establish a real connection between his mind and the object; and if the demonstrative pronoun does that (and unless it does its meaning is not understood) it goes to establish such a connection, and so is an index. The relative pronouns, who and which, call for similar observation; only in ^{then} that case, the observation is directed to the words which have gone before. Sangers use, A, B, C, practically as very effective relative pronouns. The terminations which in an inflected language are attached to words "governed" by other words and which serve to show which the "governing" word is are likewise indices of the same sort. Any bit of Latin poetry illustrates this, such as the 12-line sentence beginning, "Jam satis terris"

Art. 8. Signs and indices over nothing. ^{In an icon could} ~~If the meaning~~ ^{be interpreted by} ~~be translated into~~ a sentence, that sentence must be in a "potential mood". It would merely say, "Suppose a figure has three sides," etc. If an index were interpreted by a sentence, that sentence would be in an imperative or exclamatory mood. It would say "look out," or "See there!" Now a symbol differs from an icon and from an index, in that it declares something. It is in what is unfortunately named the "indicative mood,"* instead of the declarative mood, (ἀποφαινετική ψήμη). It may be precisely defined, as follows:

A symbol is a sign which declares that the set of objects denoted by whatever set of indices are in a certain way attached

his power of observation and thus establish a real connection between his mind and the object; and so far as the demonstratives cause him to do that, without which they cannot be understood, they go to establishing such a connection. The relative pronouns who and which call for similar observation, only that in this case, the observation is directed to the words of the sentence. The terminations which in an inflected language are attached to words "governed" by other words and which serve to show which the governing word is are indices of the same sort.

Ar. 8. A symbol is a sign which declares that ~~whatever~~ ^{set of} the objects ~~is~~ denoted by whatever ^{set of indices are} ~~index~~ is attached to it in a certain way is represented by ^{an} whatever icon ^{associated with} ~~is attached~~ to it in a certain way. To show what is meant by this, take the word "loves." The icon referred to is the mental image ^{or idea} which by virtue of the ^{influences} forces which have made the English language what it is ^{is} called up by that word.

used in this sense. The expression of a reasoning in words intended to ^{make} influence another the hearer to perform the same inference is called an argumentation. Reasoning generally is sometimes called ratiocination. The belief to which the ~~reason~~ an inference leads is called the conclusion; the beliefs from which it sets out are called the premises.

Art. 3. A Belief is a state of mind, of the nature of a habit, of which the ^{person} mind is aware, and which ^{would} induce him to act, ^{supposing he acts} (deliberately, in a certain way on suitable occasions.

Thus, if a man believes that a straight line is the shortest distance between two points, then in case he wishes to proceed by the shortest way from one point to another, and thinks he can ~~pro~~ move in a straight line, he will endeavor to do so. If a man really believes that alcohol is injurious to him on the whole, and does not choose to injure himself, then he will not drink alcohol; or, if in consequence of the momentary satisfaction, he does so, he does not, on that occasion, act deliberately.

~~A belief~~ We are aware of ^{our} beliefs. A habit which causes us to act in a certain way, but ^{of} which we are ~~unaware~~ ^{unconscious}, so that we cannot directly control and criticize it, ought not to be called a belief. A person may deceive himself and imagine that he believes something that he does not ^{believe} believe.

An act of consciousness by which a ^{person} ~~part~~ recognizes, or thinks he

recognized, a belief is called a judgment. The expression of a judgment is called in logic a proposition.

Art. 4. "The unit of speech is the sentence," says one of the greatest living linguists that ever lived, the Rev. A. H. Sayce, in the article Grammar in the Encyclopaedia Britannica (9th Ed. Vol. VI. p. 43. b). Modern linguists generally will agree with him. In like manner, modern logicians hold that the unit of thought is the judgment.

Nevertheless, in logic it is as necessary to anatomize the judgment as it is in grammar to anatomize dissect the sentence.

The common grammars ^{teach} say that a perfect sentence consists of two words, or combinations of words, the subject, which denotes what it talks about, and the predicate, which says what ^{is} to be said of the subject. There is some truth in this. Yet the vast majority of languages are agglutinative, that is, they build up sentences out of bits that are not exactly what we understand by words, yet bits that have each its own distinct contribution to the meaning, and have each an incomplete meaning of its own. In fact, agglutinative speech is the type of speech; perhaps all languages were once of that character. Now in the most agglutinative languages a single long word often makes a sentence. Sayce instances, kuligtchis, which in Delaware means "give me your pretty little parr."

the object of an index as if it directly excited the sensation of a certain icon, and this act is virtually ~~that such a result~~ because it is an act whereby that icon becomes joined to that index so that it will be ~~excited~~ brought up to the mind when the object of the icon attracts attention. This action is a mental symbol. A corresponding symbol may be spoken or written, and is the outward expression of such an act.