THE FOUNDER OF TYCHISM, HIS METHODS, PHILOSOPHY, AND CRITICISMS.

IN REPLY TO MR. CHARLES S. PEIRCE.

INTRODUCTORY AND PERSONAL.

SOON after I had received Mr. Peirce's manuscript he wrote me in a private letter as follows:

"You have not found, I trust, that in my rejoinder I have anywhere overstepped the limit of amiable disputation. If anything of that kind did, unconsciously to me, in the heat of composition, slip from my pen, I am most anxious to have it pointed out to me, so that there may be no feeling in the matter of a disagreeable kind. For if you should not mention it, I should at some future time discover it, and it would be a source of real unhappiness to me."

This is a very amiable disposition of mind. Mr. Peirce presses me very hard in the struggle for truth: he does not hesitate to take advantage of even the smallest weak point which he espies or rather which he believes he espies. He does not shrink from using plain terms, such as "absurd," "unthinking," "weak," "hasty," "irrational." Yet he preserves in the heat of the controversy a friendly spirit towards his antagonist, which I cannot but appreciate and wish publicly to acknowledge. But I would not have him change a word or soften the language of his article in the least, *for my sake*. If Mr. Peirce is wrong, I will take care of myself; if he is right, let the truth come out.

We are both, as it were, by profession champions of truth; so we need not mind an occasional fling if in the end the cause of truth be promoted. Especially, in the present case, I need not mind the

hard blows which Mr. Peirce deals with such assurance, for all the points at which he strikes are well protected. The fiercer the onslaught, the better the test. I feel satisfied that his severe scrutiny only serves to prove the strength of the position which I defend.

I shall speak my mind as freely and unreservedly as does Mr. Peirce, and hope he in his turn will resent plain words as little as I do. As offense is not intended, so offense should not be taken.

Let me add here in these introductory remarks that I am always open to conviction. The views which I uphold have been well considered and thought out in their most important consequences. They are consistent and well guarded in spite of Mr. Peirce's thinking the contrary, so that I feel no need of changing them. But should some unforeseen difficulty arise which would oblige me to revise the whole system of my ideas, I shall not hesitate publicly to confess it and allow myself to be lead by truth whithersoever it be.

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The issue of our controversy is the problem of chance—not of chance as it occurs, for instance, in the throw of dice, but of "absolute chance," or perfect lawlessness. Mr. Peirce makes absolute chance the corner-stone of his philosophy; he propounds a radical and sweeping indeterminism, while I reject the idea, not of chance, but of absolute chance as incompatible with the philosophy of science.

I. DIFFERENCES OF METHOD.

Mr. Peirce calls himself a Scotist and professes to represent mediæval Realism, speaking at the same time of me as a Nominalist. We find, however, that the inverse statement would be nearer the truth.

Before discussing Mr. Peirce's philosophy itself, we must examine his methods. Difference of method will produce important divergencies of opinion.

1. ATTENTION TO DETAIL.

Mr. Peirce takes up in his rejoinder many incidental points, which have little or no bearing upon the main issues between us. On the one hand, things of no consequence, such as my granting

that "absolute chance" like the impossibilities of fairy tales, is not unimaginable, and my saying that tychism is attractive but weak for lack of arguments, are adduced as "momentous admissions," and "inconsiderate concessions." On the other hand, Mr. Peirce catches at straws to prove a lack of information on my part. He cannot forbear calling attention to the little breach of etiquette committed in not giving an English baronet his proper title.

Mr. Peirce shows on all these and other occasions a love of the incidental, and if I were to allow myself to follow his example the battle would soon be broken up into innumerable skirmishes.

It is noteworthy that Mr. Peirce's procedure appears to be a nominalistic tradition. Nominalists, regarding universals as mere names of many particular things, have always showed a great preference for the single, the incidental, the scattered; while realists viewing universals as real things were in the habit of laying perhaps too much stress upon universalities and generalities to the neglect of the particular and individual.

Indeed, Mr. Peirce's favorite idea, which is a belief in absolute chance, is in my opinion the most nominalistic and anti-realistic proposition I have ever met with. Regularity, or natural law, is to him the product of evolution. Thus he demolishes the eternity of the universal, and eternity is only universality in time. Now suppose that eternity (i. e. universality in time) could be proved an error; then, the universality of the universal in space also will become illusory. If those abiding features of nature which we call natural laws have indeed originated from a general sporting, from chance, from a chaotic lawlessness, by a gradual habit taking, who can assure us that nature has not taken different habits in other parts of the universe?

I look upon Mr. Peirce as an extreme nominalist, or, if he prefers it, as a nominal realist soaked with nominalistic opinions. He professes to be a realist, but he rescinds the foundation of realism.

Like the bear of the hermit Mr. Peirce throws the stone at the fly of necessary connection, and in doing so kills the philosophy of realism itself.

2. ORIGINALITY.

Originality, wherever we find it, is pleasing; but a hankering after originality is dangerous. Experience teaches us to regard a thinker's love of originality as one of the main causes of his going astray. Let the poet be original, but not the scientist, not the philosopher, not the searcher for truth. The conceit of being original flatters our vanity, and original ideas in philosophy are tantamount to original errors.

I do not deny the value of originality, but I do deny that it is a criterion of truth.

Originality consists in the free exercise of our imagination, and a vivid imagination is very valuable to the thinker. But it so happens that every dreamer cherishes with a mother's love the children of his fancy. And it is, therefore, necessary to be especially critical with the offspring of one's own brain.

Kepler ("who," Mr. Peirce says, "comes very close to realising my ideal of the scientific method") was endowed with an extraordinarily vivid imagination. He invented an extremely original scheme of explanation for the solar system, and expounded it with great poetical fervor in his "Mysterium Cosmographicum."*

Kepler at once became famous by his "Mysterium Cosmographicum" and was generally admired for his originality. But his bent for hatching original ideas did not alone make Kepler what he is to us now in the history of science. A greater quality than his poetical fervor and original imagination was his rigorous self-criticism. He took notice of every little fact that did not agree with his

* Kepler's scheme is, that all the regular solids, icosahedron, dodecahedron, octohedron, tetrahedron, and cube should be placed one within the other at such distances that spheres could be described between them so as to touch the corners of each respective interior and the planes of each respective exterior solid. He found, by placing the sun in the centre and allowing the planets to move in great circles on the spheres, (making the circle between the icosahedron and dodecahedron equal to the orbit of the earth,) that then the distances between the planets would, upon the whole, agree with astronomical observations.

This theory is as ingenious, as fascinating, and as original as Mr. Peirce's propositions. It has only one little fault; it does not agree with facts. And Kepler afterwards abandoned his original theory.

theories, and for the sake of truth, of objectively provable truth, that is, the agreement of his views with positive facts, he sternly slew all those creatures of his fancy which he foresaw could not survive.

Having myself a good deal of imagination, and having tried myself many original ideas, I can appreciate the self-denial and discipline of Kepler. I have come to the conclusion that originality is only an important means of attaining truth. Our ways of reaching the truth, our methods of finding it, may deserve the praise of originality, but truth itself is never original; for truth is the faithfulness of a copy which in our representations we make of reality, and to praise ideas as original is certainly no argument that they are true.

There is no need of showing that Mr. Peirce is not just in his statement of my view of originality, by maintaining that I have advised people "think not for yourself." Confessedly he exaggerates, but in truth he misrepresents.

Mr. Peirce does not relish what I have to say on the subject, and, to pacify his mind, he does not tire of praising originality as the high-water mark of genius.

Mr. Peirce's love of originality is a nominalistic feature of his mind. A nominalist who denies the existence of universals cannot understand that everything in science must be sacrificed to truthfulness. The question, Does this idea correctly represent its respective reality? has no sense to a nominalist. The nominalist is only interested in what a thinker makes of things. The subjective conception, in his opinion, exhausts the subject. I can understand that a nominalist should be greatly pleased with originality, but a realist should not allow himself to be seduced by its charms.

Mr. Peirce's penchant for, and my distrust of, originality, have a direct influence upon our respective methods of thought. It naturally makes him bolder and me more cautious.*

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* Like Mr. Peirce, Kepler had, in his days, too, thought of the possibility of making the world evolve from chance. When, in 1604, a new and brilliant fixed star suddenly appeared in Ophiuchos, he took up the problem of star-evolution. We will let Kepler tell the story in his own words as it appears in his treatise on the new star:

"Yesterday, while pondering over the problem, I was called to dinner, and my young wife served the salad. 'Do you think,' I asked her, 'if since the origin of

3. A MODERN PROCRUSTES.

There was a man in ancient Greece named Procrustes, who had two beds; one long, the other short. He used to lay his tall guests upon the short bed, and his short guests upon the long bed, cutting off the limbs of the former and stretching out the bodies of the latter, until they fitted the size of their unpleasant resting places. In the same way Mr. Peirce treats philosophical views.

There is the bed of the materialist and, as all processes to the materialist are purely mechanical, necessitarianism is stretched in the materialist's bed to mechanicalism. I plead, since ideas and feelings are not motions, that mental processes cannot be explained by the laws of motion, but can, for that reason, be none the less determined; but I plead in vain. That view of necessitarianism does not suit the bed upon which my Procrustes places me. Other views, however, are cut down without further ado because they are said to be nominalistic. Anything that does not appeal to Mr. Peirce's realistic mind is dismissed with a shrug.

I am neither a realist nor a nominalist, or rather, I am both realist and nominalist. I am convinced that to some extent both sides were right and both sides were wrong, and regard it as our duty to sift their propositions and accept the truth whether it be nominalistic or realistic.

We must follow the principle of hearing both sides, and not consider at all whether a statement agrees or disagrees with certain party principles.*

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creation, pewter platters, salad leaves, oil and vinegar, and also hard-boiled eggs had been flying in a chaotic mixture through space that *Chance* would have been able to collect them to-day in a salad?' 'Certainly not in such a good mixture as this is,' was the reply of my beautiful wife."

Kepler rejected the idea that the world could have evolved by chance.

* The philosophical articles of the *Century Dictionary* do not seem to be free of party spirit. An extraordinary amount of praise is given to the mediæval realists which, considering the vagaries of their propositions, they do not deserve. On the other hand, the blame for the discredit into which scholasticism has fallen is heaped upon the nominalists.

4. OCCAM'S RAZOR.

The most brilliant disciple of Duns Scotus was William of Occam, whose fame almost rivalled that of his master. Occam became an adversary of realism ; he became a nominalist, and after him was named a method known as Occam's razor, especially useful to nominalists in their warfare against realists.

Occam's razor is expressed in the sentence : "*Entia non sunt multiplicanda præter necessitatem*," which means : Only in cases of extremest necessity are we allowed to assume the existence of hypothetical facts. If assumed facts are not absolutely indispensable, cut them off !

Occam's razor was invented for a special purpose, that of cutting off the realistic hypostatisation of abstract ideas.

I do not know which is more startling, that a realist in name, such as Mr. Peirce, should use a weapon forged by nominalists against realism, or that he whom in other respects we found in such a close contact with nominalistic methods, should not understand how to handle a nominalistic weapon.

Mr. Peirce censures me for making the statement that the formal is subjective as well as objective. This, he says, is cut off by Occam's razor.

The formal is subjective, for our sensation is possessed of form and our mind is in possession of formal thought. It is objective, for reality is not void of form and the things are such as they are by virtue of their peculiar shape.

The proposition that the formal is objective and subjective at the same time is as little cut off by Occam's razor as, for instance, the proposition that there is air inside and outside of us, viz. in our lungs and in the surrounding atmosphere.

Mr. Peirce's usage of the beds of Procrustes is cruel, but his usage of Occam's razor is inconsiderate. He should be careful in handling such a sharp knife, lest he do himself harm.

Mr. Peirce uses Occam's razor to cut off statements and facts which make his pet theories dispensable; but he forgets that Oc-

cam's razor cuts off ideas only, and when it comes in contact with facts its edge is turned.

Occam's razor is an excellent instrument to dispose of such hypotheses as absolute chance, for it declares that if their assumption is not quite indispensable, we must cut them off.

Now it either is or is not a fact that the formal is objective and subjective at once. It cannot be untrue in my philosophy while it is true in Mr. Peirce's system. My proposition of the formal being at once objective and subjective is, according to Mr. Peirce, "cut off by Occam's razor." "But," adds he, "when synechism has united the two worlds this view gains new life." So long as I say so, it is wrong; but should I adopt Mr. Peirce's system, it will pass as right.

5. THE APPLICATION OF LEARNING.

Philosophers should make it a rule not to encumber their thoughts unnecessarily with learning. The great problems of philosophy are, in my opinion, much simpler than they are generally supposed to be. The art mainly consists in stating them in the simplest possible manner.

It is indispensable for a philosopher to be familiar, at least in a general way, with all the most important sciences, especially with psychology, physiology, logic, physics, mathematics, and mechanics. But he should not for that reason introduce any more than he can help their complicated details into his expositions.

Every specialist is inclined to look at things through the spectacles of his own speciality. But the philosopher who takes a higher standpoint should be on his guard. He should always endeavor to simplify matters and avoid introducing into philosophy issues which belong to a special field, and derive their peculiarities from special conditions. To confound the methods of the various sciences, or to generalise without sufficient discrimination, will throw everything into confusion.

Mr. Peirce, as we well know, has greatly distinguished himself in logic by valuable discoveries and independent investigations. We have repeatedly taken occasion to pronounce unreservedly our admiration of his achievements in this field. But we cannot ap-

prove of his application of certain methods of his speciality to philosophy in general. Mr. Peirce is inclined to look at the world through the spectacles of that new and extremely specialised branch of logic which he is at present about to invent.

One hindrance to properly appreciating his doctrines, says Mr. Peirce, lies in my "laboring under the great disadvantage of not understanding the logic of relatives," which, he adds (p. 533):

"Is a subject I have been studying for a great many years, and I feel and know that I have an important report that I ought to make upon it. This branch of logic is, however, so abstruse that I have never been able to find the leisure to translate my conclusions into a form in which their significance would be manifest even to powerful thinkers, whose thoughts had not long been turned in that direction.'

I shall be glad to sit at Mr. Peirce's feet as an attentive student, as soon as he has worked out his logic of relatives, or any other subject. But I cannot now accept any of his theories on the credit of some half-developed science, be it ever so profound or intricate, until I see plainly its connection with the present issues.

Mr. Peirce trusts that his favorite ideas will find support in his peculiar conception of the logic of relatives. Judging from the quiddities which he now so confidently propounds as weighty arguments, we cannot share his sanguine hopes. His arguments, to be derived from the logic of relatives, are like promises to pay out of the returns of a gold-mine, just discovered and boomed by the owners. There may be gold in the mine, but I do not as yet take any stock in it.

Mr. Peirce promises to prove by the logic of relatives what, if it were true, he should be able to demonstrate in plain language.

I have an idea that the logic of relatives can be worked out into as clear a science as is mathematics or algebra. But what shall we say when told that the logic of relatives is really abstruse, and that he who labors under the disadvantage of not understanding this abstruse science is not prepared to grasp Mr. Peirce's philosophy? The abstrusity, in my mind, counts against Mr. Peirce's philosophy, as much as against his logic of relatives.

In my childhood I was much plagued with Latin, but as soon as I had acquired a smattering of it, I began to talk Latin to the

servants, and when they did not understand me I thought that they were "laboring under the great disadvantage" of not speaking Latin. Since then I have learned to translate my Latin into the language of the people with whom I have to deal.

Mr. Peirce seems to rely on his learning in proportion to its abstrusity; he likes to walk on stilts.

Mr. Peirce is scholarly to excess. He has a special talent of rendering issues involved. Not even his references to my articles in *The Monist* are made directly by quoting the pages on which they appear. That method would be too common. He invents a ponderous system, necessitating the reader to look twice when he wishes to find a passage,—a scheme which is original and very dignified in appearance, but makes quotation unnecessarily complicated.

Learning is a virtue, but even virtues should be used with discretion.

6. THE PRINCIPLE OF POSITIVISM.

Says Mr. Peirce in confirmation of Whewell (p. 546):

"Progress in science depends upon the observation of the right facts by minds *furnished with appropriate ideas.*"

To rely on the observation of facts is, in my opinion, a principle of positivism. That facts must be observed "by minds furnished with appropriate ideas" is undeniable, but ideas, in order to be appropriate, must be true; they must be representations of facts.

Because he relies on facts I have characterised Mr. Peirce's method as positivistic. But he indignantly repudiates "the charge" as "totally unfounded."

Positivism (which I have always carefully distinguished from Comtism, the latter being a special kind of positivism*) is not a peculiar philosophy, but a most important principle of science.

Mr. Peirce seems to use the term positivism in a different sense

* I said in *Fundamental Problems*, page 142, "The introduction of the word positivism into philosophy is the merit of M. Auguste Comte. Although we cannot accept much of M. Comte's conception of positivism we gratefully adopt the name." There are plenty of other passages in which my usage of the term positivism, as distinguished from the French positivism, is set forth, so that there could be little danger of being misunderstood.

from that in which I use it. Be it so. I shall not nominalistically quarrel about words so long as there are more urgent subjects under discussion. Noticing that Mr. Peirce does not state that all ideas should be ultimately reducible to facts, he is to be acquitted.

7. LOPPING OFF THE ABSOLUTE.

Mr. Peirce thinks that an agreement between us could be arrived at. He says (p. 545):

"Dr. Carus's philosophy would, in its general features, offer no violent opposition to my opinions" (§ 16).

But the condition is (p. 545):

"To lop off the heads of all absolute propositions whose subject is not the Absolute."

As a matter of fact I have lopped off all absolutes. If Mr. Peirce were more familiar with my views he would have known that. Thus, on my part, I had done all I could to come to an agreement with him long before he asked me to do it. But I fear that having also lopped off the Absolute itself, I did too much of a good thing, for Mr. Peirce carefully records his opposition to all philosophies which deny the reality of the Absolute. (See § 18.)

I wish to improve this occasion for conciliation, by turning the tables. Mr. Peirce's views would, upon the whole, offer no violent opposition to my opinions if he would only consent to lop off the absolute-property of his absolute chance. I would even swallow his Absolute if he would promise to designate by that name some real quality of the world, or the world itself as a whole, or something that is thinkable without making one's head swim.*

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* My main objection to the term Absolute is to forestall any hypostatising of a vague abstract notion which can only serve the purpose of mystification. I suffer the term Absolute in a loose sense when it is understood that it is used loosely. I do not say, as Mr. Peirce seems to believe, "absolutely universal" or "absolutely necessary." The words universal and necessary are sufficiently significant to me without any additional emphasis.

Reality is relative throughout. Absolute existences are, if the term is taken seriously, nonentities; and the expression "The Absolute" for the whole of existence or for those features of existence which are universal and necessary is, to say the least, misleading. These are my reasons for rejecting the Absolute as a philosophical term. There is, of course, no objection to the term in chemistry, physics, mathematics, and other sciences, where it has acquired technical meanings.

Every predication of absolute, changes a real and useful idea into its caricature. To say that a complicated calculation is "absolutely true," that is, true without stipulating the condition that the methods are right, and that the execution is made without any mistake, is ridiculous; and thus the phrase "in a Pickwickian sense" (which we gratefully borrow from Mr. Peirce) would always form a drastic but adequate substitute for the term absolute. "Absolutely true" is "true in a Pickwickian sense" only. There are no absolute truths which are in this sense unconditionally true. In the same way, "absolute chance" is different from that real chance known to us in experience and instanced by the throw of the dice. Absolute chance is "chance in a Pickwickian sense."

Strange Mr. Peirce speaks of real chance when he means an imaginary absolute chance. He apparently uses the word "real" in this connection not to denote something that is a fact of experience but to express the idea of its being perfect or complete. Thus we may speak of a "real" perpetual motion, stating at the same time that it is neither real nor realisable.

8. THE THEORY OF PROBABLE INFERENCE.

Mr. Peirce applies his theory of probable inference to everything; also to those cases which are unequivocally determined. He granted in a private conversation that $2 \times 2 = 4$ admits of no exception. But of other purely formal statements which are in the same predicament, for instance, that the sum of the angles of a triangle in a plane measures 180°, he states as probable that they are either somewhat less or somewhat more than 180°, adding, "that they are exactly that amount is what nobody can ever be justified in concluding." To determine the sum of the angles of a plane triangle by measuring the parallaxes of stars rests upon a fundamental misconception of the principles of formal sciences. It would be consistent for Mr. Peirce to say, that $2 \times 2 = 4$ is true only according to the definitions or axioms of arithmetic. But in order to know whether $2 \times 2 = 4$ in reality, we ought to apply the theory of probable inference. Until we had verified the statement $2 \times 2 = 4$ by applying this formula to the farthest solar systems, we should not be justified

in concluding that it is exactly true. The theory of probable inferences is supposed to help us out of this perplexity, "and within another century our grandchildren will surely know whether the three angles of a triangle are greater or less than 180°."*

There is always danger in the application of abstract ratiocination; and the theory of probable inference forms no exception to the rule. On the contrary, it is especially liable to lead one astray. There is the case of the doctor who said to his patient: "I am sure you will be cured, for I had ninety-nine patients who died during the operation, and statistics prove beyond doubt that one among a hundred will survive it. You are the hundredth."

The theory of probable inferences is often misapplied, but can it be worse misapplied than by introducing it into the province of that which is certain? There is no sense in applying the theory of probabilities to what is certain. We may doubt whether the rays of light travel in exactly straight lines, but we cannot doubt

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* Mr. Peirce correctly says that the axioms of geometry are now exploded. This, however, does not overthrow the reliability of formal mathematics; on the contrary, it places it on a safer basis than that of unprovable assumptions, which must be taken for granted.

We look upon the whole system of geometry as a *product of mental operations*. We perform some operations and note what their products are. We do something and mind the consequences of what we do. The problem of modern geometry is to invent a method by which we can construct in the simplest manner possible a straight line and a plane. Euclid still presupposes the existence of the plane and assumes it to be such that parallel lines do not meet. When we are able to construct the plane of Euclidean geometry, we can dispense with the axiom of parallels, for, in that case, the plane will possess the qualities it has by construction. We can very well execute other constructions in which parallel lines possess other qualities, and we shall on the basis of such an altered plan of operation be able to produce entirely different systems of geometry.

We must distinguish between the space of our mathematicians and real space. Experience teaches us that real space has three dimensions which means that from a given point every other point is determinable by three magnitudes. We might doubt (although I think there is little occasion to do so) whether the real space of our experience is truly three-dimensional, but we cannot doubt that the truths developed in the one-dimensional system of numbers, in the two-dimensional system of plane geometry, in the three-dimensional system of solid geometry, and also in *n*-dimensional systems each in their respective domain are perfectly reliable, for they are unequivocally determined, they are *eindeutig bestimmt*. There is no application of the theory of probabilities in a field where the products are not due to chance but result with certainty.

the straightness of lines in plane geometry. We cannot doubt that all the radii in a circle are equal, or that the sum of the angles of a Euclidean triangle are 180°.

9. ZWEIDEUTIG BESTIMMT.

Mr. Peirce very kindly informs me that the term *eindeutig bestimmt* is a translation of a French phrase. Very well, I do not deny it. I know very well that the phrase has a long history, but I do not consider myself bound to present the whole pedigree of every term I use.

Does Mr. Peirce perhaps suppose that the French phrase is the original? If we have to go back to the original beginning at all, why does he not tell us that the French *univoque* is a translation from the mediæval Latin *univoce*, which was coined and used by the schoolmen in opposition to *æquivoce*. Neither the term *eindeutig*, as Mr. Peirce asserts, nor its scholastic original *univoce*, is an exclusively mathematical expression.

Although the term *eindeutig* is a translation of the French *univoque*, there is after all a great difference between the French term and the German term, and I have a good reason to prefer the German expression. The French term is nominalistic or even vocalistic, the German one is realistic. *Univoque* and *univocal* mean that there is only one name or one *vox*, while *eindeutig* lays no stress on the name but on the meaning of the name, denoting that which admits of but one interpretation. This is a sufficient reason for me to prefer it, and it ought to appeal to Mr. Peirce's realistic mind.*

Mr. Peirce, maintaining that *eindeutig bestimmt* is only a mathematical term, adduces two equations, each one of which, taken singly, admits, he says, of two possible determinations.† Mr. Peirce uses these equations as an argument against my application of the term,

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* I wonder why the *Century Dictionary* does not mention the scholastic usage of the word *univocus* as the root of univocal. Similarly we are not told that the word *incompossibilitas* is an invention of the schoolmen. Duns Scotus, Mr. Peirce's favorite philosopher, uses the terms *univoce* and *incompossibilitas* freely.

† We accept in this argument Mr. Peirce's solutions, which, however, are his own. A simpler example would have been more appropriate.

adding, sarcastically: "This shows how much that argument amounts to." But his example proves at best only that there are incomplete determinations; some problems allow of several solutions. In a German township in which blue hussars are garrisoned, children used to propose to another this profound problem: "It lies under a plum-tree and is blue; what is it?" If the child questioned argues, "It is a plum," he is corrected, "No, it is a hussar." But if he argues, "It is a hussar," he is corrected, "No, it is a plum." So he has no chance of guessing right. The result of Mr. Peirce's first equation, which may be either 11·477 or 11·523, is like the conundrum of the plum-tree: it amounts to the same, viz. to nothing, and proves only that there are determinations which are *zweideutig bestimmt*.

10. EXPLANATION.

The differences of method become very serious when we disagree on the very meaning of "explanation" itself. How can two debaters accept or reject one another's arguments, if their ideas of explanation are radically different?

Mr. Peirce's definition of the term "explanation" appears to me very unsatisfactory. He says (p. 57):

"I cannot admit that explanation is description of the fact explained. It is true that in the setting forth of some explanations it is convenient to restate the fact explained so as to set it under another aspect, but even in these cases the statement of *other* facts is essential. (!) In all cases it is *other facts*, (!) usually hypothetical, which constitute the explanation; (!) and the process of explaining is a process by which from those other facts the fact to be explained is shown to follow as a consequence by virtue of a general principle or otherwise."

"To explain a fact is to show that it is a necessary or at least a probable result from another fact (!) known or supposed."

My definition of "explanation," as a description in which the process described is recognised as a transformation is sneered at. Says Mr. Peirce (p. 558):

"A magician transforms a watch into a dove. Recognise it as a transformation and the trick is explained, is it?, This is delightfully facile."

Indeed, the magician's trick is explained as soon as we know all the changes that have taken place. Take the whole number of

objects handled by the magician, those which he shows and those which he conceals. Let us observe how he hides the watch and how he produces the dove, and the trick is explained. Is it not?

Explanation is, as the word suggests, a making plain, so that we can look over the whole field before us, and leave nothing hidden from sight. This whole field, the survey of which is needed for the recognition of the transformation, is called the system of the explanation. After we have seen how the changes take place, and after we have described in exact formulas their modes of action, our desire for explanation is completely satisfied.

The instances adduced by Mr. Peirce prove plainly that his objections cannot be maintained. Every one of them is an instance of transformation (with the exception of the emerald vest, which, however, is not stated with sufficient completeness). Take, for instance, the following example adduced by Mr. Peirce (p. 557):

"A 'special process of nature,' calling for explanation, is the circumstance that the planet Mars, while moving in a general way from west to east among the fixed stars, yet retrogrades a part of the time, so as to describe loops in the heavens. The explanation is, that Mars revolves in one approximate circle and we in another."

Can any one deny that this explanation is a description? We draw the two orbits as correctly as possible for the required demonstration and combine the points representing the earth with those representing Mars at their successive positions. Considering the fact that we do not perceive the motion of the earth, we have to construct a diagram in which the directions of these lines are described as viewed from a stationary point. This is a description of changes that take place. It is a portrayal of the transpositions of two bodies, and the appearance which the change of this relation presents to one of them.

Mr. Peirce has neither the grace nor good-will to understand my proposition, that *explanation is always a tracing of form.* He says (p. 558):

"Forms may indulge in whatever eccentricities they please, in the world of dreams, without responsibility."

In the world of dreams, yes! But not in the world of reality.

And even the irresponsible eccentricities of dreams take place according to law.

Feeling that he mistakes my position, Mr. Peirce adds:

"Should Dr. Carus reply that I mistake his meaning, that it is only 'being in general' (§ 66), that he holds unaccountable, I reply that this is simply expressing scepticism as to the possibility and need of philosophy." (P. 558.)

Of course, I mean "being in general." As to the scepticism imputed to me, I answer, that any attempt at explaining how matter and energy, which I take to be eternal, came into being, is a wrongly formulated problem. Mr. Peirce might as well call me a sceptic, because I recognise that we cannot square the circle. (Compare "Fundamental Problems," 2d ed., pp. 283–285 and 291.)

Mr. Peirce's gravest mistake is his belief that

"In all cases it is *other facts* which constitute the explanation." (P. 557.)

The practical application of this mistake becomes fatal to his philosophy.

It is by no means necessary to pass beyond that system of facts which contains the phenomenon to be explained. We must, as a matter of course, keep completing the facts of a phenomenon until we have acquired a survey of what we call the whole system of the facts, but we have never to resort to other facts.

We are confronted every day with hundreds of facts of which we never see the whole system to which they belong, but we readily supply these deficiencies from the stock of our experience. We refer the unknown to the known. The single case under observation is referred to something with which we are familiar. Those systems of explanation which are known to us serve as patterns for others that are only partially known, and we fill out, with their assistance, the gaps of our observation.

The readiness and reliability of our explanation thus depends upon the stock of knowledge we have. The more we know, the easier shall we conquer the unknown; the more incomplete our knowledge is, the greater the number of hypothetical facts that will have to be introduced; and this always weakens the reliability of our explanations. Hypothetical facts should be introduced only in

cases of urgent necessity. However, if they are admitted at all, they have to be thought of as parts of the system under investigation, for they have been invented only because we are compelled to assume that without them it would be incomplete.

Mr. Peirce adduces the following example to prove that "other facts" are required in an explanation:

"It has been stated that a warm spring in Europe is usually followed by a cool autumn, and the explanation has been offered that so many more icebergs than usual are liberated during a warm spring, that they subsequently lower sensibly the temperature of Europe. I care little whether the fact and the explanation are correct or no. The case illustrates, at any rate, my point that an explanation is a special fact, supposed or known, from which the fact to be explained follows as a consequence." (P. 557.)

When, as in this instance, we recognise that one fact is the necessary result of another fact, we view them both as parts of one set or system of facts in which a transformation is taking place, and, unless we see the connection of the two facts as constituting one process of transformation, we cannot say that the problem is explained. When we observe changes which are the results of transformations taking place beyond the horizon of our knowledge, we are, as a matter of course, unable to give an explanation.

Mr. Peirce had perhaps in mind a special and more complex kind of explanation, which we define as "comprehension." He says (p. 557):

"The fact to be explained is shown to follow as a consequence, by virtue of a general principle or otherwise."

Take as an instance the law of gravitation. There are the facts of falling stones and the motions of celestial bodies. Both sets of facts are explained, according to Mr. Peirce, "by virtue of a general principle," i. e. gravitation, while we say, both sets of facts are comprehended under a common formula. Mr. Peirce's conception of "explanation" rests on the antiquated view that gravitation is a principle behind the gravitating masses which compels the stone to fall. Gravitation, however, is not "another fact" foreign to the facts under consideration. It is not a principle called in from the outside. On the contrary, it is the essence and extract of the very facts that are to be explained.

Principles which have not been derived either from the facts to be explained, or from the additional facts which belong to their system, do not and cannot explain the phenomena.

* * *

Comprehension is, as it were, an explanation of a higher degree. The term means a grasping together, and it actually consists in viewing two or several facts in such a way as to recognise their common features. Comprehension is a reduction of our patterns of explanation; it unites two or several of them in one formula.

For instance, it has been observed that certain objects float in water while others sink to the bottom. The observations do not seem to agree, they present two incoherent facts. When we find out that the weight of a floating body is equal to the weight of water which it displaces, we understand at once why bodies whose specific gravity is greater than water sink while those of a lighter specific gravity float. Comprehension, in this as in every other case, is the description of a process which comprises all the facts that belong to a special class in a common formula. The description must be applicable to all single cases however different they may be.

This conception of comprehension has a great advantage over Mr. Peirce's view. While he has to bring in some "other fact" from the outside, we need not introduce any foreign element. Comprehension, as we understand it, can rise from the statement of particular facts to more and more general formulations, until finally we arrive at universal laws. All the laws thus formulated to satisfy our cravings for comprehension, are found to belong to one great system of laws, and our scientists are constantly engaged not only in widening the range of our experience by new discoveries, but also in revising our statements of the uniformities of nature and, where they appear to be in collision, in bringing them into harmony.

This conception of comprehension is monistic, Mr. Peirce's is dualistic. We need not, in order to explain the facts of existence, go beyond them into a supernatural realm. Mr. Peirce must go outside of the world into non-existence when he attempts to understand the world by the principles of his philosophy. It is very doubtful whether explanations, the "essential" nature of which is to consist

of "other facts usually hypothetical," will be satisfactory to anybody except himself.

Otherness makes any fact unfit to serve as a factor of an explanation and indeed I cannot think of any instance, real or imaginary, in which the explanatory facts, be they real or hypothetical, do not form parts of the system under consideration.

There is only one instance to which Mr. Peirce's method of explanation has been applied, and I am under the impression that it has been invented solely for this purpose. Mr. Peirce's philosophy is too original to be explained by the usual methods; it must have an original method of its own. In order to explain "law" Mr. Peirce calls in "chance." His explanation must be an "other fact" and the only fact different from law is not-law, lawlessness, or absolute chance. According to my idea of explanation, law can never be explained by chance. According to Mr. Peirce, it is the only possible thing that can be called in as that "*other* fact" which is supposed to be the essential constituent of an explanation.

If Mr. Peirce's method of explanation were sound, we should have to explain order from chaos, possibility from impossibility, and sense from nonsense.

II. MR. PEIRCE'S PHILOSOPHY.

Mr. Peirce's constant references to scholastic philosophy remind me of happy years long past when I was extremely interested in the theories of such men as Thomas Aquinas, Duns Scotus, Occam, Abelard, Tauler, and others. Together with my chum, now a sober Professor of physics at a German University, I freely indulged in the construction of various world-theories, which, alas! were quickly overthrown one after another by the slightest puff of wind. I have not lost my interest in the schoolmen, but it is considerably weakened.

Mr. Peirce's repeated praise of scholastic realism and his condemnation of any theory that he brands as nominalistic, seems to me like the method of some of our politicians who, eager to revive toryism, should censure all evils of the politics of to-day as whiggish. This comparison is not exaggerated, for there are a few Hamiltonians who

miss the refining influence of an aristocratic class and regret that the historical tradition of toryism has been so completely broken. I would not deny that there is some truth in it, and there is some truth, too, in mediæval realism, which has been neglected by the, first violently suppressed and then triumphant, nominalism. But in reviving realism the Scotists should be very careful to avoid a resurrection of its errors.

1. DUNS SCOTUS AS A PHILOSOPHICAL PATRON SAINT.

Johannes Duns Scotus, a Franciscan, honored since his sucessful defense of the Blessed Virgin's Immaculate Conception by the title Doctor Subtilis, and the very same man after whom, on account of the narrowness of his later disciples during the time of the Reformation, a blockhead is to-day called a dunce, was one of the most characteristic figures of scholastic philosophy. He lived at the end of the thirteenth century when the authority of the philosophy of Thomas Aquinas who had died March 7th, 1274, was all but universally recognised. Scotus appeared as the most powerful opponent of Thomas. Ingenious, original, bold, and buoyant in his attacks he had a short but brilliant career and died comparatively young at Cologne, in November, 1308.

While Thomas, surnamed Dr. Universalis, or Dr. Angelicus, is regarded by his order, the Dominicans, as the greatest authority in philosophical matters, Scotus succeeded in impressing his mode of thought upon the Franciscans; yet Thomas is universally regarded in the Roman church and also among Protestant theologians as the more orthodox Christian.

Almost all the ideas of Scotus were set forth in opposition to the views of others and mainly of Thomas. Thomas was a determinist, Scotus an outspoken indeterminist. Thomas says that man's action is necessarily determined by what he thinks is best. Scotus avers that man thinks in a certain way because he wills in a certain way. Man's ideas are fashioned to suit his character. His motto is, "*voluntas superior est intellectu*" and his idea of will is identified with the indetermined arbitrariness of a perfect *liberum arbitrium*. According to Thomas, God commands us to do the good because it

is good. Scotus calls good that which God commands simply because God commands it. The will of God, like the will of man is, in Scotus's opinion, undetermined, it is arbitrary. Thus God created the world not because his will was determined by some motive, but because it so pleased him; and Christ's passion and death were not really an atonement; they simply were accepted as such by God.

Without entering into this controversy of *anno olim* we might say that we side neither with Thomas nor with Scotus, but would modify the statement of the former by the criticism of the latter. Thomas goes too far when he says that whatever is recognised as the best will of necessity be done. He overlooks the power of passions. Thomas's statement would be right, if every passion were regarded as a will which has its own and independent but mistaken ideas about good. A soul whose passions are more powerful than rational considerations will necessarily be inclined to obey its irrational impulses. There is something in Scotus's criticism, but his view is no improvement. In speaking of will as superior to the intellect, did he ever ask himself the question, What his own will would be independent of his intellect? Further, when God is said to command the good because it is good, Thomas separates in a logical consideration two ideas which are identical. Scotus is right in defining good as the will of God. From our standpoint we should say, the will of God, viz., the moral order of the universe, is of a definite kind which can be ascertained by experience. To speak of the will of God as good is an anthropomorphic expression. Good is that which agrees with the will of God; bad, that which opposes it. Suppose the moral order of the universe were different, goodness and badness would change with it.

We have sketched the views of Scotus only to show the points of contact between him and Mr. Peirce. Mr. Peirce is also an outspoken indeterminist. He identifies feeling with chance, and his free will is a *liberum arbitrium*. Mr. Peirce, like Scotus, also separates theology, and, with it, religion, from philosophy.* Scotus

* The belief in a duality of truth appears quite rational from the dualistic standpoint of the middle ages, and the arguments of Scotus are cleverly devised, being based upon the supposition that the fall of man had changed the entire order of the

ridicules those who confound both, clearly indicating that he is aiming at Thomas, to whose fervent faith their conciliation was a matter of momentous and all important consequence. Scotus goes so far as to aver that something might be true in philosophy which is wrong in theology (see Ed. "Wadding" Fol. 4, p. 848)—a statement that to an honest searcher for truth must almost appear as frivolous.*

How much more imbued with true religiosity was his great namesake John Scotus Erigena the venerable founder of scholasticism when saying: "*Non est alia philosophia, i. e. sapientiae studium, et alia religio.*"

2. MR PEIRCE'S ORIGINAL THEORIES.

Mr. Peirce as a controversalist and critic is like Scotus, brilliant, versatile, and powerful. But he is more; he is also constructive.

Mr. Peirce's style of architecture reminds us of neo-Platonism, and this is quite in harmony with Scotism, for Scotus, through Avicebron, derived many of his ideas from the Neo-Platonists. Mr. Peirce proposes a modern view of emanation, which starts the world from that βυθος of nothingness which at the same time is the womb of all existence. The primeval state of being, says Mr. Peirce, "Was mere nothing from a physical aspect," but, if it was not really nothing, what, then, was it?

It was chance.

Here lies the essential difference between Mr. Peirce and the neo-Platonists. The neo-Platonists (whose speculations, if they are treated not as philosophy, but as poetical effusions, are very profound and thoughtful) look to the Logos, or world-reason, as the beginning of the world emanation, while Mr. Peirce shows a certain contempt

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world, so that the laws of nature prior to the Fall were different to those which obtain now.

* Duns Scotus was a very zealous advocate of ecclesiastical supremacy, even advising, for instance, the prosecution of the Jews in order to convert them. It is a strange irony of fate that the author of the *Fons vitæ*, upon whose authority Scotus so largely depends and from whom he derived some of his most important ideas was an Israelite. Scotus did not know that Avicebron was a pseudonym of the Spanish Jew Salomon ben Gebirol.

for reason. To the neo-Platonist, reasons *are* explanations, while to our modern Scotist, reasons explain nothing. He says:

"Reasons explain nothing, except upon some theistic hypothesis which may be pardoned to the yearning heart of man, but must be doubtful in the eyes of philosophy . . . ." (P. 567.)

Mr. Peirce goes so far as to speak of "the dullness of ratiocination's self."

Mr. Peirce's gospel would deviate in the very first verse from that of St. John, for it would read

Ἐν ἀρχῇ ἦν ἡ τυχή.—In the Beginning was Chance!

And this chance which was in the beginning actually is, to Mr. Peirce, God, a personal God, an anthropomorphic deity endowed with conciousness. He says:

"That primeval chaos in which there was no regularity was mere nothing from a physical aspect. Yet it was not a blank zero; for there was an intensity of consciousness there, in comparison with which all that we ever feel is but as the struggling of a molecule or two to throw off a little of the force of law to an endless and innumerable diversity of chance utterly unlimited." (*The Monist*, Vol. III, No. 1, p. 19.)

And in another passage he says of chance:

"That it is a being living and conscious is what all the dullness that belongs to ratiocination's self can scarce muster hardihood to deny." (P. 560.)

Mr. Peirce's argument that all the dullness that belongs to ratiocination's self can scarcely muster hardihood to deny his proposition, sounds strange in the mouth of a scientist. But it is not strange; for I have found that enthusiastic defenders of improbable theories always fill the holes of their argumentation with abuse of those who dare to discover these holes. Call a person who doubts the truth of your statements dull, and you will frighten many a weak mind into a patient acceptance of your view.

We may rest assured that whenever a philosopher scolds he is at his wit's end. For why should he lose patience if he can prove his proposition? Thus diatribes are always symptoms that there is some flaw in one's logic and the louder one chides the sorer is the spot.

Mr. Peirce is serious in the statement that chance is a conscious being. He actually identifies chance and feeling. He says:

"Chance is but the outward aspect of that which within itself is feeling."

The primordial chance, the existence of which, according to Mr. Peirce, "calls for no explanation," has "a primordial habit-taking tendency." Whence this tendency gets into the universe of absolute chance, Mr. Peirce is unable to disclose. The deviations from the mechanical order in the present course of things, which, by the by, are by no means proved, suggest to him and justify, in his opinion, this assumption. Thus, assumes he, primordial chance ceased to be chance; it changed by a gradual habit-taking into regularities. Consciousness ceased to be consciousness and became crystallised into natural laws. Mind ceased to be an arbitrary sporting, and by becoming effete it begot, through a summation of minute effects, this material universe of ours. Accordingly, real existence or thingness consists merely in the regularities thus produced, and "physical events are but the degraded . . . forms of psychical events."

This is in brief Mr. Peirce's cosmogony, which, as the prophet of Tychism, he reveals to us in axiomatic aphorisms.

By gradual habit-taking, Mr. Peirce declares (*The Monist*, Vol. I, No. 2, p. 176), mind will at last be "crystallised in the infinitely distant future." This rather sad outlook is, in another passage, modified by a counter-oracle, which announces that "an element of pure chance survives." Why, he does not say. Irregularities, not being entirely suppressed, can increase again, and as such they are "undeveloped forms of psychical events." Says Mr. Peirce (*The Monist*, Vol. III, No. 1, p. 18):

"There are almost insensible fortuitous departures from regularity; these will produce, in general, equally minute effects. . . . Protoplasm is in an excessively unstable condition. . . . In the protoplasm these habits are to some slight extent broken up, so that, according to the law of mind, . . . feeling becomes intensified.

"This breaking up of habit and renewed fortuitous spontaneity will, according to the law of mind, be accompanied by an intensification of feeling."

This is the gist of Mr. Peirce's mental philosophy, which proclaims that "consciousness is not to be reinstated without tychism." The reappearance of chance is said to explain the origin of mind!

Our conception of mind is different. We see mind develop out of sentiency by the recognition of the regularities of the surrounding world. Reason is almost a synonym of man's ability to form generalisations, of his having and operating with concepts, of his thinking ideas. Not the arbitrariness of a wilful mind is the properly mental of man's soul, but his reason; and man's reason originates under the influence of the uniformities of the surrounding world, which impress themselves, in what we call experience, upon his existence. The more a creature recognises the regularities of existence, and the more its soul becomes an image of this world-order, which is the prototype of his reason, of the divine Logos, the higher it rises in the scale of evolution.

If chance, as Mr. Peirce declares, is but the outward aspect of that which within is feeling, we should henceforth have to look upon the roulette and dice as sentient beings.

3 THE FOUR POSITIVE ARGUMENTS OF TYCHISM INSUFFICIENT.

Mr. Peirce adduces four positive arguments for believing in absolute chance. They are: (1) the prevalence of growth; (2) the variety of the universe; (3) the necessity of explaining law; and (4) the existence of feeling.

By growth, Mr. Peirce does not understand the growth of crystals, or trees, or organisms. That kind of growth is a mere transformation. Mr. Peirce's idea of "real" growth is "opposed to the conservation of energy." It is not an increase of the thing growing through the assimilation of substances taken from the surrounding world; it is an actual increase of energy, not a mere change; it is a growth of the universe itself. Granted the possibility of this so-called "real" growth, and we can easily explain the evolution of the world out of the tiniest beginning. But, of course, one thing has to go: either the conservation of energy or "real growth." Mr. Peirce lets go the former, I the latter.*

* I omit here a discussion as to whether or not the conservation of energy is true or not. I need not mention that the views of our physicists, such men as Helmholtz, Mach, Maxwell, Tait, and others, differ widely from Mr. Peirce's presentation of the subject. Mr. Peirce rejects the law of the conservation of energy,

The variety of the universe is, in my world-conception, sufficiently explained by the variety of forms, for form is indeed the *principium individuationis*; a doctrine, which, but for Mr. Peirce's philosophy, I should regard as almost universally accepted. Among its advocates we find also Mr. Peirce's great master, Duns Scotus, and Scotus's teacher, Avicebron. In so far as various formations are possible, (exactly as the die can show six different surfaces,) chance plays an important part in the diversification of nature, but this chance is not to be thought of as a violation of the law, but appears to be a special case only, and a true manifestation of the law under complicated conditions.

Chance and probability are not mere subjective ideas, creatures of our ignorance, playing a role simply in our limited knowledge of the world. The words signify a certain condition of objective existence.

For instance, the probability of throwing 1 with one die is 1/6. This means, the die is so constructed that it can show six different positions, one among them being 1; and these six possibilities are as real a quality of the die, as its weight or its color.

The die has six possible positions. Now I take a die and throw 3. Are we not entitled to believe that the throw was sufficiently determined by all the innumerable conditions which accompany the act? We confidently think so, and feel no need of assuming any absolute chance. Now I throw again. What is now the probability of throwing 1? We answer again, 1/6. And, lo! there it is! It came at the second throw, and we ask, was our statement of the probabilities wrong? We say, no! it was not wrong, for it remains true even now. The statement does not mean that we shall throw a 1 at each sixth throw, but that (supposing the die to be perfect) 1/6

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but retains the conservation, or (as he prefers to say) perduration of matter. I waive the question, whether this is consistent, and call attention only to another, most flagrant contradiction. Mr. Peirce states that, "not only the total amount [of matter] remains constant, but all the different parts preserve their identity"; and yet he says that "matter is effete mind." Thus when mind becomes effete, the amount of matter increases; however, when the habits of matter are broken up, mind originates, and the amount of matter decreases. This, it seems, would make any perduration of matter and of the identity of its different parts impossible.

among all the possible throws will be 1, so that supposing all the possible throws realised in an infinite series of throws, the average number of 1's among them will be the one-sixth part of the whole.

The enormous importance of chance (viz., of that real chance which is no violation of the law) has been recognised since Democritus and has received a fresh illustration from the investigations of Darwin, which I need not here recapitulate.

The theory of probabilities teaches, that whatever can happen in the long course of an infinite number of events, actually will happen, and that whatever, according to the nature of things, has a greater probability, will in an infinite number of cases occur with proportionately greater frequency.

The lesson which we have to draw from this statement is, that that which we wish not to happen, should be made impossible. And this can be done, perhaps not perfectly, but approximately. According to Mr. Peirce, the evolution of mind is due to the reappearance of chance; we say that the evolution of mind is marked by man's increasing power in the restriction of chance.

The identification of chance with feeling, or even with mind, is to me an idea so grotesque, that I am inclined to regard it as a relic of gnostic speculations.

Mr. Peirce, instead of attempting to comprehend laws, as we do, seeks to trace their origin. He tries to explain their existence by growth, as if they were beings that evolve like the forms of planetary systems or the organisms of living creatures. Considering the fact that Mr. Peirce is a realist only in name, and that his philosophy is soaked with nominalistic traditions, we should say (and Mr. Peirce will pardon me that I quote the expression from him) that:

"The puzzle for him is simply the usual difficulty that plagues nominalism when it finds itself confronted with a reality which has an element of generality.'

The assumption of absolute chance might be used to account for any otherwise inexplicable event, but Mr. Peirce does not countenance this idea. He warns us to be cautious in its use, like the druggist who labels his poisons "handle with care"; "I only use chance," he says, "to give room for the development of law." Hav-

ing used absolute chance to start the world with, he dismisses it. So Fiesco discharges his negro after he has done his work : "*Der Mohr hat seine Schuldigkeit gethan, der Mohr kann gehen.*"

In my criticism of Mr. Peirce's theory I said (*The Monist*, II, p. 574):

"How little, after all, we can escape the determinism of law as being a feature of the world, will be seen from the fact that the explanation for the evolution of law is presented by Mr. Peirce as being itself a law, i. e., a formula describing a regularity supposed to obtain in facts."

Mr. Peirce replies :

"Is there no difference between a law, the essence of which is to be inviolable . . . . and *that mental law, the violation of which is so included in the essence that unless it were violated, it would cease to exist ?* . . . . Thus I clearly escape the contradiction attributed to me." (P. 561.)

Mr. Peirce's escape is like the disappearance of a medium from a room without doors. He must have got out through the fourth dimension. The argument is so subtle that I cannot see it, and I feel tempted to retort in a sentence quoted from my profound adversary :

"I confess, I can find only words without ideas in the objection." (P. 561.)

Mr. Peirce speaks of law as having developed out of chance, but he himself, in fact, after a fashion, explains the origin of those laws of nature which represent its present uniformities by a law of habit-taking.

That the conservation of energy should leave no room for feeling is to me an obscure proposition. The law of the conservation of energy declares only that the sum of all energy in the world, potential as well as kinetic, remains constant. If a living and feeling being renews its waste and stores up new energy in its tissues, it must take it out of the general storehouse of nature ; it must transform it, and cannot produce it out of nothing. Why should feeling become impossible, if the conservation of energy is true?

The identification of chance with feeling is, to my mind, a vagary. It is true that feeling develops mind ; mind makes deliberation possible, and deliberation implies choice. But choice is not

chance. The choice which a man makes is determined by his character. There is more resemblance between logical identity and a pun, than between feeling and chance.

4 THE NEGATIVE ARGUMENT A LOGICAL FALLACY.

The four positive arguments for believing in absolute chance are untenable. But Mr. Peirce, knowing that he had to weather a storm of criticisms, has taken along a sheet-anchor, consisting of a negative argument, which, if it were true, would make the four positive arguments redundant.

What shall we say to the statement, that chance need not be explained? Mr. Peirce says:

"Chance, according to me, or irregularity,—that is, the absence of any coincidence,—calls for no explanation. If *law* calls for explanation, as Dr. Carus admits it does, surely the mere absence of law calls for no further explanation than is afforded by the mere absence of any particular circumstance necessitating the result." (P. 559.)

Mr. Peirce is a great logician, but the logical arguments of his philosophy are not sound. If the absence of law, of coincidences, of regularities, did not require explanation, the scientist would (as is but right) still have to explain the uniformities of nature, but the miracle monger would have a good time; for he could tell us boldly that, according to the rules of modern logic he is not bound to give any explanation.

It is true that while everything must be explained, the absence of everything (i. e. nothing) need not be explained; but we cannot use this pattern as a schedule which can be filled out at our pleasure. The ideas "absence of," "no," "no one," and "nothing" play a part in logic analogous to that of zero in mathematics. I need hardly remind the reader of the puzzling demonstration, that since one cat has one tail more than *no* cat, and since no cat has eight tails, one cat must have nine tails. Operations with zero act like death in the realm of human conventionalities. Death makes the beggar equal to the king. Multiply any equation that is wrong with zero, and it will be correct. Operations with zero render the impossible possible.

But let us look closer at Mr. Peirce's proposition. He avers that "the mere absence of any particular circumstance necessitating the result calls for no explanation."

Should it ever happen that the absence of any particular circumstance necessitates the result, I do not see why this absence should remain unexplained. Say for instance, a certain stronghold is taken because the enemy discovers the absence of guards in a certain part of the walls. If this absence of guards be counted as an important circumstance helpful in the conquest of the citadel (and there is no reason why we should not count it as such) can we say that while the presence of guards on all other spots of the wall has to be and can be explained as an endeavor to secure the place against a *coup de main*, the mere absence of guards calls for no explanation? The absence of guards in a particular spot of the Capitol during the siege by the Gauls, was accounted for by the steepness of the place. This particular spot was regarded as safe on account of its inaccessibility. Similarly, the absence of guards in the citadel of the Messenians is explained by the idea that the Spartans would make no attack because in that particularly stormy night a cloudburst seemed to prevent all approach.

Obviously the necessity of explaining a rule, does not confer the privilege of neglecting to explain its exceptions.

It goes without saying that Mr. Peirce's argument (even if it were formally faultless) can have no force with a necessitarian. Such a one, after having explained and proved to his satisfaction that *Gesetzmässigkeit* (or regularity such as can be formulated in laws) is a characteristic feature of the universe, is not only asked to believe that there are after all exceptions to law, but is even told that according to some paragraph in Mr. Peirce's unwritten logic of relatives no further argument is needed to prove the non-existence of law. Only Mr. Peirce's extreme love of his pet theories can make him blind to such palpable fallacies. But such are the foundations of his philosophical architecture.

III. MR. PEIRCE AS A CRITIC.

A good general, who has to mask the weak points of his position, uses the strategem of making demonstrative sallies upon his enemy. Mr. Peirce, although apparently quite unconscious of the fact that his basic doctrines are untenable, instinctively imitates this maxim of warfare. His defence is mostly aggressive. Instead of replying to my arguments he endeavors to represent my views as incohesive and contradictory.

The present issue is not whether my views are tenable, but whether Mr. Peirce's are. However, I am glad to have the benefit of the searching criticism of so subtle a thinker as Mr. Peirce. Therefore, I willingly appear before his tribunal to expurgate myself of his charges.

1. THE A PRIORI AND POSITIVISM.

Mr. Peirce is greatly puzzled with my position. He quotes several statements of mine which appear to him contradictory. I said: (1) that millions of *single* experiences cannot establish a belief in necessity, (2) that necessitarianism must be founded upon the *a priori*, and (3) that the *a priori* must be founded upon experience.* To him who overlooks the here italicised word "single" this may, indeed, seem to be a vicious circle.

All knowledge begins with experience. We define experience as the effects of events upon sentient beings, and these effects are sense-impressions of certain forms and interrelations. At an advanced stage of evolution, the formal and relational are first unconsciously, as, for instance, in counting, and then consciously, with scientific deliberation, abstracted from the sensory. Systems of pure forms are constructed out of the purely formal elements, thus gained from experience by abstraction, such as our system of numbers and the logical categories. Now the laws of these forms of thought are

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* That my view of the *a priori*, as Mr. Peirce claims, is "Schleiermacherian" is new to me.

applicable to all formal and relational conditions of reality. The formal and relational of reality are known to us even in those regions of the universe and in those provinces of scientific investigation which have not as yet been explored. The scientist knows them *a priori*, even before he investigates objects which he never saw before. He is acquainted with certain of their qualities, viz., with the laws of their formal and relational conditions.

Thus the *a priori*, or, as I prefer to call it, formal thought, is a product of experience, and is again applicable to experience.

Single experiences, isolated observations, innumerable particular cases cannot directly yield or reveal the laws of formal thought. So long as they remain single and isolated they will never develop into mental factors; but such is the nature of reality that the single experiences will be built up and arranged in feeling substance as systematically as, for instance, the formation of crystals or the harmonious growth of cells in organisms? When sentient creatures become conscious not only of the sensory element of their experience, but also of this system of their soul, of the formal of their psychical existence, they become rational beings; and the formal which grows with their sentiency is not an exclusive and peculiar quality of theirs; it is not purely subjective, but it has been imparted to them, piecemeal, together with the single data of their experience. It constitutes a part of their *Anschauung*; it is found in the objective world and is a general feature of reality.

Out of the formal elements of our *Anschauungen*, of the facts of experience, that organ of cognition is developed which Kant calls "pure reason."

Experience is often used to denote sense-experience only; thus Kant contrasts experience or sense-perception, which he calls *a posteriori*, with pure reason and formal thought, which he calls *a priori*. We use experience in the sense defined above, *so as to include the formal element*.

I am unable to form a clear conception of Mr. Peirce's view of the *a priori*. Those systems of formal thought which I regard as constructions he regards as products of analysis. He says, "They are results dependent upon the action of reason in the depths of our

own consciousness." He only grants that "their abstract and distinct formulation comes very late." He still holds that the *a priori* is innate.

In my conception, mathematical ideas, like that of the contrivance of logarithms, are inventions; and they are constructions as much as the invention of the steam-engine by James Watt.

There is one peculiarity about the purely formal which is not found in the sensory elements of experience. Our knowledge of the various spheres of the purely formal is of a general nature; it applies to any form of the same kind. This gives system to our formal conceptions, and enables us to make statements which are rigidly and unequivocally determined. It is this quality which makes them available as an organ of cognition when dealing with facts of experience. They furnish us with methods, schedules of reference, and plans which like blanks have to be filled out.

Science begins with the application of formal thought, viz., with counting, measuring, and classifying. Only with the assistance of the formal sciences can we master the material of the sensory data of experience; and thus it happens that the formal is the condition, not of any kind of experience, but of every systematic experience.

The formal sciences are the tools of cognition. That to which they cannot be applied remains unexplained, and this is the ultimate reason why processes of nature can be regarded as explained only when recognised as processes of transformation. Cognition is the tracing of form. We can understand a change only if it is a change of form. We cannot understand how anything real can disappear into, or originate out of, nothing. We have no explanation for any actual increase or decrease either of matter or energy. Whenever we see something entirely new we regard it as a new combination, the elements of which existed before.

If there were processes in the universe which could positively be proved not to be transformations we should be confronted with an unfathomable mystery; and it is a matter of course that we must not be duped so easily by the appearance of problems which cannot be solved at first sight. The advance of science which has resolved so many mysterious phenomena into plain instances of transformation

gives us confidence that this method is the only reliable maxim of inquiry. It has helped us so far, and it will help us in the future.

* * *

I call my views positivism, because like the French positivists and also like Locke and his school I maintain that all knowledge is to be derived from the positive facts of experience. But my positivism is not of the old kind; it is neither sensationalism nor materialism nor Comtism. It is a new positivism broadened by a study of Kantian philosophy and Kant's problem of the *a priori*; and this new positivism, I hope, deserves the attention of the thinkers of mankind.

Mr. Peirce calls it a "straddling of the question," by which he means that a man is "on both sides of the fence," and has learned so to formulate the issues, "that both parties can readily subscribe to his propositions."

2. DETERMINISM AND FATALISM.

Fatalism and determinism must not be confounded. We define determinism as that view, according to which every event is determined by its conditions. The decision of a man whose liberty is not curtailed by any compulsion, so that he can act as he pleases exactly in agreement with his character, is determined objectively by the motive and subjectively by his character. A man of a certain character in a given situation will act in a way that is perfectly determinable.

Determinism, as I take it, does not exclude free-will. Nor does it exclude such chance as is, for instance, the incidental turning up of the various faces of a die.

Determinism is the basis of science, and also of ethics as a science. If the decision of a free will were merely the result of chance, why should our teachers and preachers take so much trouble to form character?

While determinism is a sound doctrine, fatalism is a superstition. Fatalism excludes the idea of free will. We define fatalism as that view which regards the fate of a man, whatsoever he may do, as fixed. For instance, we call the orthodox Mohammedan a

fatalist; he looks at the flame without quenching it, because he argues, "if it is Allah's will that my house burn down, it will burn down, whatever I may do."

In my reply to Mr. Peirce (*The Monist*, Vol. II, p. 572) I approvingly quoted from him a passage containing the word "fate," adding that here "the word 'fate' must be understood as Mr. Peirce understands it." In spite of this warning, Mr. Peirce employs this quotation made from *his* writings as if it were mine, and calls attention to the inconsistency involved in the different application of the word. This charge of inconsistency is neither judicious nor fair!

We define "necessary" as "that which is determined."

Determined means describable. Necessity is that feature of things which makes it possible that we can, in proportion to our knowledge, describe beforehand or predict the course of events.

Kant's definition of "necessary," as given in his "Critique of Pure Reason," is narrower. He says:

"That the coherence of which with the real is determined according to universal conditions of experience is necessary, or exists necessarily."

This means in our phraseology, "that feature of the real which is determined by the laws of form."

The word "determinism" has been inappropriately used in the sense of fatalism, in which sense it has to be condemned as a superstition. The term is needed, however, to denote a basic principle of great value. "Determinism," if used in the sense which the word literally indicates, means "that view which regards all events as determined by its conditions." Determinism does not mean that everything is decreed by some fate, that some Deity or other power has determined the course of events. It means that definite conditions produce definite results, and that the results can be ascertained and described, if *all* the conditions are known.

Fatalism is a peculiar kind of determinism, and, indeed, an obviously erroneous one. Fatalism rests upon a dualistic conception, regarding necessity as a foreign force residing outside and above things and compelling them to act in a special way. It is the Moira of the ancients and the Kismet of the Mohammedans. The monistic view knows nothing of a foreign force or supermundane *fatum* en-

acting a special course of affairs. Necessity, in the monistic conception, simply denotes the determinedness of results by its conditions; it signifies that *Gesetzmässigkeit*, or regularity according to law, is a feature of reality. We need not repeat again that the monistic view of determinism excludes neither chance nor free-will. It only excludes "absolute" chance and that indeterminable arbitrariness which is sometimes said to be free-will.

If events were not determined, if under the very same conditions the same causes could bring about different results, so that no regularities formulable in laws existed, the world would be a chaos and no cosmos, absolute chance would prevail, and science would be impossible.

Mr. Peirce not only confounds fate and necessity, but he also identifies them with resistance, and with reality. My idea of necessity has as little to do with the experience of reaction as, for instance, with the idea of density, or with pleasure and pain. To confound such heterogeneous concepts must be productive of confusion. No wonder that Mr. Peirce makes the confession that these ideas seem to him "of a mixed nature."

That my presentation of the case of Determinism *versus* Free-will results in "a doctrine to which the advocates of free-will will generally subscribe as readily as their opponents," is used as a reproach; but I do not take it as such, for my intention is not to side with one party, but to bring out the truth of both views.

3. NATURAL LAWS, DESCRIPTIONS.

Mr. Peirce makes the following allegation of inconsistency. He says of me:

> "The declaration (§ 198) that 'natural laws are simply a description of nature as nature is,' and that 'the facts of nature express the character of nature,' are nominalistic. But in another place (107-115) he says distinctly that uniformities are real." (P. 531.)

I am unable to detect any inconsistency in these expressions. The gist of these three statements is this: the formulas usually called natural laws describe certain uniformities of reality.

The expression "description of nature" is by no means nomi-

nalistic. If law is said to be a description, it is not a mere name, but presupposes the existence of some objective reality for the description of which it has been formulated.

4. CAUSATION.

Mr. Peirce's usage of the word "cause" is very unsettled. He says (p. 538):

"The original idea of an efficient cause is that of an agent, more or less like man."

The original idea of "cause" is the struggle of reaching an end or bringing about a certain state of things. The Latin *causa* means "a lawsuit."

In a similar way, the German *Ursache* does not mean the original thing, but a "seeking." *Sache* is the English *sake* and Gothic *sakjô*, meaning "struggle," or "quarrel." It is derived from the same root as the verb "to seek."

Like *causa*, the word *Ursache* was used as a legal term.

Mr. Peirce further states:

"The modern mechanical conception, on the other hand, is that the relative positions of particles determine their accelerations at the instants when they occupy those positions." (P. 538.)

"In dynamics, it is the fixed force, gravitation, or whatever else, together with those relative positions of the bodies that determine the intensity and direction of the forces, that is regarded as the cause." (P. 540.)

"The practice which I endeavor to follow in regard to the word *cause* is, to use it in the Aristotelian sense of an *efficient cause* in all its crudeness." (P. 541.)

"When my idea is a more general and logical one, I prefer to speak of the explanation." (P. 541.)

No wonder that some causes are prior to their effects, others simultaneous, and that effects may even be prior to their causes! Using the word in various senses, Mr. Peirce becomes so entangled about causation, that in mustering the ideas force, position, reason, law, cause, and explanation, he no longer knows which is which.

* * *

Mr. Peirce being unable to bring any consistency into the usage of the term "cause," drops it entirely as a philosophical word. This is Dr. Ironbeard's method, who kills his patient to save him pain.

There was a time when I felt inclined to follow that plan of dealing with words in this predicament. But I found out very soon that there is not one difficult word in philosophical language which is not or was not at some time or other almost universally maltreated by the professional thinkers of mankind. What, then, is to be done? Shall we eradicate all old terms that are erroneously used and create a philosophical Volapük, which will have the advantage of being unincumbered with the errors of a long historical inheritance, but the disadvantage of being nowhere spoken and nowhere understood, except by its inventors?

Dr. Ironbeard's method of dealing with terms is radical. It imitates the method of the social reformers who, on finding something wrong in society generally, propose to tear down the entire social structure, and begin the world over again from its beginning.

Most of the terms which have been in use for centuries and even millenniums, I have found to correspond to a special want of expressing some definite reality or constant group of realities or important relation among realities. The misuse of different words almost invariably has its origin in a consideration of the name alone, to the neglect of the reality denoted by the name. And misuses can be mended only by carefully investigating the realities themselves for the denotation of which the words have been invented. If we were to make a clean sweep of the "superstitions," soul, God, cause, natural law, etc., because in many minds there are superstitious notions connected with these ideas, we should soon have to invent new terms for the realities which necessitated the formation of the old ones. The great bulk of religious and philosophical words originated because in each case there was an actual want of a phrase to denote some specific reality. The errors of the various terms arise because our ideas concerning the nature of these realities have not as yet been matured, and it is the office of the philosopher to contribute his mite toward their clarification.

Causation, in my conception, is transformation. Take any system of conditions and let it somehow be changed. The event which starts the change is called the cause, the new configuration

produced, the effect. The various factors of the system are the conditions or circumstances.

Taking this view, I *do not say* that the effect is the cause transformed. The total effect is the cause plus all the circumstances transformed. The effect is something radically different from the cause. The cause is always an event, that is a motion of some kind; the effect, a new arrangement, a new formation, a new state of things, or perhaps the dissolution of an old state of things.

While cause and effect are different, the whole process of causation, including cause, circumstances, and effect, is to be viewed as one fact, or, rather, as one system of facts; and a process of causation is explained, (as we have seen above) as soon as it is so described that we recognise it as a transformation.*

There is a popular usage which calls the cause of the falling stone gravitation. This kind of cause is not an event, not a motion, but a law of nature, and I prefer to call it "the reason" for the stone's fall.

Mr. Peirce defines a reason as follows:

"A reason, in one sense, is the replacement of a multiple-subject of an observational proposition by a general subject, which by the very conditions of the special experience is predicable of the multiple subject." (P. 558.)

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* It is a matter of course that frequently several events coöperate to bring about an effect. In that case we have our choice, either to speak of several causes, or to treat the coöperation of all of them as *the* cause, or to select one of them to be called the cause, while the others may be counted among the conditions.

The limitation of a system of causation depends entirely upon the purpose of our inquiry, and we must here, as in many other things, use discretion.

Mr. Peirce concludes, that according to my view of causation we can, in a relatively uniform motion, such as the flight of a cannon ball, regard the motion of every moment as the cause for the motion of the next moment. I say "relatively," for absolutely uniform motion does not exist. I grant this, but I do not grant what Mr. Peirce regards as a contradiction of mine, that in that case the cause would be equal to the effect. A man who knows the artifices of the hair-splitting Eleates and the other conundrums of logic, should know that every second of time is different from every other second; 12 o'clock is different from 1 second past 12. He who denies this, has only to miss a train in order to be converted. And how much more different than the moments of time are the various moments of real motion, for in every moment the moving body is in another place, with changed relations; and if that does not constitute a difference, we should have to deny the existence of motion.

This somewhat stilted definition seems upon the whole to agree with what I also call "a reason." All the reasons by which we comprehend nature are formulated in statements which describe those general features of reality which we call "laws of nature."

Who does not see that causes (i. e., events which produce effects) and reasons (i. e., the formulas by which we comprehend the uniformities of nature) are two radically different ideas, and who can deny that the denotation of these two radically different ideas, by one and the same term, must and actually does bring about lamentable confusion in the minds of philosophers! Accordingly, let us call them by different names; never mind what we call them, but let us distinguish them. I regard the usage stated here as the most appropriate. We call "the cause" of the stone's fall that event which removed its support; but when we inquire after the reason why the stone falls, we want to know the law of nature which describes in a general formula that quality of stones which makes them fall.

5. THE FUTURE IN MENTAL CAUSATION.

It seems as if some evil genius had caused Mr. Peirce to cross my position everywhere, even where I should expect to find him in perfect agreement.

Concerning mental and mechanical causation he first startles me with an italicised proposition which declares:

"*There is no mechanical truth in saying that the past determines the future rather than the future the past.*" (P. 539.)

Mr. Peirce apparently intends to discredit the belief that the past determines the future. He adds:

"We continue, for convenience, to talk of mechanical phenomena as if they were regulated, in the same manner in which our intentions regulate our actions, (which is essentially a determination of the future by the past,) although we are quite aware that it is not really so." (P. 539.)

In other words, Mr. Peirce contends that our view of mechanical causation is based upon an analogy with mental causation; the latter being a determination of the future by the past, we conclude that the former is regulated in the same manner.

This is an old error which rests on the supposition that cognition begins with introspection or self-knowledge. The truth is that all cognition begins with objective observation.

We have to say, (1) that man's view of mechanical causation has not been fashioned after the model of mental causation, and (2) that the future actually enters as a factor in mental causation. We do not believe that the future determines the past, but it does determine the present.

Should we judge of the causation of mechanical motions from our own mental experience, we should certainly reach other conclusions than we do, for the most characteristic feature of mental causation, that which essentially distinguishes it from mechanical causation, is the fact that the future actually enters into it as the main factor.

We as rational beings, and the lower animals also on a smaller scale, do know to some extent the future. We know by experience the effects of certain actions. This fact of the future's being partly known, makes it possible for the future to enter as a factor in mental causation. I go so far as to maintain that there is no mental causation except some consideration of the future be contained in the motive cause. The presence of a plan, of an end kept in view, of an aim to be reached in the future, is exactly what distinguishes the purposive action of thinking beings from mechanical events.

6. MENTAL CAUSATION.

Mr. Peirce has discovered in my expositions of mechanical and mental action what he believes to be a flagrant contradiction, and, as if it were the exhibition of my scalp, displays it triumphantly (§ 27) in capitals and italics. "No objection can be made," I said, "to the possibility of explaining the motions . . . . of the brain by the laws of molar and molecular mechanics." And "yet the simplest psychical reflexes cannot be explained from mechanical or physical laws alone."

Is this really a contradiction, or is it Mr. Peirce's inability to discover the agreement between the two statements? Let us see.

Take a little toy fish of tin with a small iron rod in its snout,

floating in the water, and push the fish so that it shoots forward with a certain velocity in a straight line. Now take a magnet and hold it at a short distance from the prolonged path of the fish. The fish at once changes its course; it now describes a curve which according to the laws of mechanics is determined (omitting any other possible modifying circumstances) by the momentum of the push, the velocity of which is gradually diminished by the friction of the water, and the attraction of the magnet. These are the data, and from these data the motion of the fish is unequivocally determined by the laws of mechanics.

Now, when we speak of the motion of the fish, we mean the motion, and not the iron rod, or the qualities of the iron rod, in its snout. While speaking of motion or the laws of motion, and while calculating the curve of a motion, our ideas move in a perfectly defined sphere of abstraction from which all other things and considerations are excluded. This method of abstraction which is the essence of human thought and also of that special kind of human thought called science, is the way by which alone we are enabled to arrive at clear distinctions and lucid explanations. We have to keep our various abstractions stored in an orderly manner in our mind, each one in a special box. If we do not distinguish the different spheres of abstraction and their limits, we shall soon confound all issues in a hopeless chaos.

But we find, on further examination, that in this limitation of the description to the abstract sphere of pure motion only a part of the process before us is described. The description explains fully, exhaustively, and satisfactorily the mechanical aspect of the case, but it does not explain why the magnet attracts iron. The attraction of the magnet consists in the definite qualities of (1) the magnet, (2) the iron, and (3) the medium between them. When we inquire after an explanation of the physical qualities of things, we enter into another sphere of abstraction, viz., that of physics. That physics will have to be explained as a domain of molecular mechanics may be mentioned incidentally.

Take another and simpler instance: the fall of a stone. The motion of the stone, its increasing velocity during the fall can be

explained according to the laws of mechanics; but that quality of the stone called gravity, which is the reason of its fall, cannot be deduced from the laws of mechanics. The gravity of a mass is treated in mechanics as the given fact or datum, an investigation into the nature of which is excluded from the sphere of mechanics. He who demands of mechanics an explanation of gravity searches in the wrong box.

When we come to the investigation of psychical phenomena, we strike a feature which is entirely absent in mechanics, physics, and chemistry. It is the appearace of feeling. Feelings vary according to the various impressions made by surrounding objects. The same objects making the same impressions, special kinds of feelings come to stand for or to represent their respective kinds of objects, and thus feelings acquire meaning, feelings become ideas. This peculiarity of sentiency, that it has acquired meaning, is the characteristic feature of "mind."

When speaking of mind I refer to all those phenomena of meaning-freighted feelings which ensoul thinking beings; and the domain of psychology is thus again quite a distinct domain of abstraction.

Now let us return to the contradiction of which Mr. Peirce accuses me.

An idea which physiologically considered is a special brain-structure or combination of brain-structures, reacts upon a given stimulus, which, let us say, is the sound of a certain word. The word is a sound-symbol and the word possesses a certain meaning. The word spoken having the same meaning as a special idea that is thought, while its brain structure is agitated, possesses a quality comparable to chemical affinities. This peculiar word will serve as a stimulus for this peculiar idea. It will not (at least not directly) stimulate other ideas—as little as a chemical that has no affinity for the ingredients of another chemical will cause a reaction. Why the motion takes place calls for a psychical explanation, but the motion itself takes place in strict accord with the laws of mechanics.

But are not the laws of mechanics annulled by the laws of physics, and those of physiology by the laws of psychology?

No, they are not annulled, but modified.

A piece of iron that falls to the ground with the same velocity as a stone of equal weight will be held up by a magnet strong enough to hold it. This is not an annulment of the gravity of the iron; it is not a reversion of the law of gravitation; gravitation holds in this case as good as in any other. It is only a modification and a complication. We must remember that the law of gravity does not say, the non-supported piece of iron or stone will drop; it says that all bodies are attracted by the earth with a definite force depending upon their mass and position. And this attraction takes place in our example; the iron supported by the magnet retains all its inherent gravity, which is constantly asserting itself, although counteracted by the force of the attraction of the magnet.

Since the mechanical, chemical, psychical, etc. qualities represent reality in various abstract aspects, we should know that there are no purely mechanical, no purely chemical, no purely psychical phenomena. Every real phenomenon, i. e. the original whole from which the abstractions have been made, presents a complex state of things of which many various aspects can and must be taken.

I repeat now without fear of contradiction or misçomprehension, that brain-motions are perfectly explainable by the laws of molar and molecular mechanics, while psychical reflexes, not being purely mechanical processes, cannot be explained by mechanical laws. The properly psychical and the properly mental are other elements of an entirely different nature from the mechanical and the physical. They belong to a radically different sphere of abstraction. He who tries to explain the psychical by the mechanical, looks for his explanation in the wrong box. And he who regards the proposition that the mechanical laws hold good for all motions without any exception, but that they cannot be called upon to explain that which is not motion, as a contradiction, has not as yet learned practically to apply the method of abstraction.

It is strange that we have to give this little lesson in the elements of abstraction lore to so prominent a logician as Mr. Peirce. We feel inclined to exclaim: "Art thou a master of Israel and knowest not these things?"

STRAY SHOTS.

There are a number of incidental comments aimed at scattered points of my position. I call them "stray shots"; they have exploded without harm. While going over the battle-field I shall pick them up and will throw some of them back into Mr. Peirce's camp, whence they came.

Mr. Peirce is in the habit of calling every approach to his views "deep," while divergencies are branded as "shallow."—

Hume's scepticism is called Leibnitz's principle, by which latter Mr. Peirce apparently means that innumerable single cases of experience alone do not constitute certainty. Why Mr. Peirce demands that Hume's conclusion which Leibnitz never would have countenanced, should be indentified with Leibnitz's principle from which it is derived is not apparent.—

How easily Mr. Peirce changes his opinion! Venn's "Logic of Chance," which Mr. Peirce so much admired formerly, has become "a blundering little book."—

Synechism and agapasticism, viz., the principle of continuity and the idea of love as main factors of evolution are nothing new. I have always defended them, although not in the peculiar way that Mr. Peirce does.* In his article "Evolutionary Love" he appears to me unjust toward Darwin. I do not think that I should improve my propositions, which are in their way synechistic as well as agapastic, by adopting either Mr. Peirce's terms or his presentation of these principles.—

Mr. Peirce says, he does not doubt that my idea of mental causation was intended to be an improvement on his molecular theory of protoplasm. I can assure Mr. Peirce that I had no such intentions. I held my view long before I ever had a chance of knowing Mr. Peirce's molecular theory of protoplasm. Moreover, I am unable to discover any similarity between his views and mine.—

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* See my article on "The Continuity of Evolution" in *The Monist*, Vol. II, No 1; and also "Monism and Meliorism," p. 73, where "the struggle for the ideal" is contrasted with "the struggle for life."

I took pains to explain that, if we disregard the notion of form, every transformation, that is, every case of causation, will appear as a most miraculous and inexplicable event. To illustrate my view I said that "*supposing we had no idea of the laws of form or only an incoherent and fragmentary knowledge of them,*" it would be "a very wonderful thing" that two congruent regular tetrahedrons when put together will form a hexahedron—a body which is something new." And I added to this statement, "*but the laws of form do perfectly and satisfactorily explain it.*" How great was my astonishment to see Mr. Peirce with great complacency take up the problem and explain it! Indeed, it is true. That the combination of two congruent regular tetrahedrons will make a hexahedron, is wonderful *only* to him who does not understand the laws of form. Otherwise, it is not wonderful. I was amused at Mr. Peirce's ingenuity to prove to me that it is a case of $8 - 2 = 6$.—

There is a difference between the combination of two tetrahedrons and of the atoms H_2O. Mr. Peirce tells me, that the one is ideal, the other real—"a difference which to his Scotistic mind is very important." Did Mr. Peirce think, indeed, that I was not aware of this difference, or does he mean to establish a rule never to compare the relations as developed in the sciences of pure forms to the relations that obtain in reality?—

Says Mr. Peirce in one passage, there is a difference between the ideal and the real, which to his Scotistic mind is very important. In another passage he declares that "the nominalist alone makes a sharp distinction between the abstract and the concrete."—

Mr. Peirce smiles at the endeavor of reconciling religion with science. For he thinks:

> "It is a thing which will come to pass of itself when time is ripe, and that our efforts to hasten it have just that slight effect that our efforts to hasten the ripening of apples on a tree may have." (P. 545.)

Mr. Peirce forgets that the religious fruits of the conciliation between religion and science are our own sentiments. He who says that man should be indifferent about working out the truth, on the plea that truth will take care of itself, is comparable to the apple-tree, that refuses to work out the ripening of the apples. The proposi-

tion to let religion and science work out their destinies, one of which is their mutual agreement, of themselves, is irreligious and also unscientific. Truth will not take care of itself if we do not strain all our efforts to find truth ; and the kingdom of heaven will never come unless (as Christ taught, Matt. 11, 12) "it suffereth violence, and the violent take it by force."—

The same Mr. Peirce who says that our efforts to hasten the conciliation of religion with science are useless, believes in miracles and proposes a theory that prayer can work miracles.—

Several philosophers, such as Locke and Hegel, have complained of the uselessness of the logical law of identity $A = A$, and also of its barrenness for any practical purpose. The law of identity has been invented nevertheless, because there is a want for it ; and this want, in my opinion, was felt because the statement of sameness (as set forth in *The Monist*, Vol. III, p. 70, et seqq.) is one of the most elementary and important forms of reasoning, being indispensable, for instance, in mathematics where it appears as equations. We may simply laugh at the old logicians

> "Who whirl in narrow circling trails,
> Like kittens playing with their tails."

We may impatiently discard the whole proceeding as empty talk, yet I submit that we had better try to understand the meaning of their unprofitable exertions and the drift of their apparently meaningless argumentations. If we regard the principle of absolute identity as the formula of sameness (in the sense explained in the quoted passage, *The Monist*, Vol. III, No. 1, p. 70, et seqq.) emptied of its contents we shall understand why logicians wasted so much energy on an entirely barren subject. We shall readily condone their mistakes in consideration of the importance of the subject. It is difficult to say how much we have profited by their blunders.—

Mr. Peirce uses the terms analytical and synthetical in a new sense for reasons which he explains at greater length in his "Theory of Probable Inferences." He says, "analytical reasoning depends upon associations of similarity ; synthetical reasoning upon associations of contiguity." I willingly grant to the scientist and the philosopher the liberty to change the historical meaning of terms if the

traditional usage is not helpful in our dealings with the facts which they were invented to describe. However, we must not change a term without good and sufficient reasons. In the present case, I still prefer the traditional usage of the terms "analytical" and "synthetic."—

Mr. Peirce takes the liberty of changing terms for himself, but he resents it in others.—

Mr. Peirce disapproves of the usage of the word "construction" in the sense of systems of formal thought, such as the decimal system, etc., etc. "Because," he says, "the word is imperatively required in the theory of cognition to denote a mathematical diagram framed according to a general precept." On the strength of this argument we might as well disapprove of calling churches, mosques, houses, cottages, or any kind of edifice, "building," because the word "building" is imperatively required to denote business-buildings.—

Mr. Peirce says that according to my statement (in ¶ 163) "every element of compulsion is to be excluded from the conception of necessity." Having never made such a statement, I looked up the passage, which is the last but one paragraph in *The Monist*, Vol. III, No. 1, page 86, and find that Mr. Peirce must have misread the sentence, "compulsion excludes free will, and necessity does not," which, of course, has an entirely different meaning.—

Mr. Peirce identifies evolution with real growth, regarding it as opposed to the law of the conservation of energy. He regards everything as a product of such growth, or *Erzeugung*, and adds, "I fancy it is this cautious reflectiveness of my procedure which especially displeases Dr. Carus." Mr. Peirce does not use the word "bold." He says, "cautious reflectiveness."—

I did not say that causation is to be explained from the law of the conservation of matter and energy. I said (*The Monist*, Vol. II, No. 4, p. 566) that the law of the conservation of matter and energy throws light upon the problem of causation. The law of the conservation of matter and energy and the law of causation describe the same thing under two different aspects. If we understand the one, it will help us to understand the other.—

Kant's chapter on the Architectonic of Pure Reason is well

known to me, but I think that Kant was possessed of a peculiar love of architectonic which has contributed not a little to rendering the system of his philosophy unnecessarily labyrinthine.—

It is surprising to find a man whom I always regarded as a Kant scholar of first degree saying that "Kant makes space a necessary form of thought." Now, as a matter of fact, Kant does not make space a form of *thought*, but of *Anschauung* or intuition. We cannot understand Kant unless we understand this distinction.*—

Kant conceives of causation as a necessary sequence. Mill, who objects to the idea of necessity, replaces Kant's words "universal" and "necessary" by "invariable" and "unconditioned," a substitution which was made with the outspoken intention of radically changing the meaning of the phrase. Mill's terms are *not* "more exact," as Mr. Peirce says, but different. They are worse than less exact to a Kantian, and can appear more exact only to those who take Mill's view, which is nominalistic. And this substitution of Mill's is regarded by realistic Mr. Peirce as a mere "rewording of Kant's definition"!—

Mr. Peirce makes too much of the idea of "*Erzeugung*, which," as he correctly says, "is Kant's word for the sequence of effect from cause." Yet Kant's idea of *Erzeugung* does not conflict with "the modern mechanical doctrine." Kant says in that very same chapter, "*Aller Wechsel* (*Succession*) *der Erscheinungen ist nur Veränderung*," i. e., "All change (succession) of phenomena is only transformation." (!) Does not Mr. Peirce know that Kant calls every world-conception that stands in contradiction to the mechanical principle "a philosophy of indolence," or "*faule Weltweisheit*"?—

The same Kant who proposed a mechanical explanation of the evolution of the starry heavens, objected very strongly to that kind of explanations "which derive all order from chance"; and speaking of Epicurus's "absolute chance" (!) he adds: "Epicurus was

* For details see, in *The Monist*, Vol. II, No. 4, page 518, et seqq., and 527, et seqq., my articles, "Mr. Spencer on the Ethics of Kant," heading iv, and "What Does Anschauung Mean?"

I now forgive Mr. Spencer; for if a Kant scholar like Mr. Peirce can fall into this unpardonable mistake, why should not Mr. Spencer, whose knowledge of Kant's writings is, as he confesses himself, extremely limited, have the same privilege?

even so reckless (*so unverschämt*) as to demand that the atoms should deviate from their straight course without any cause." Mr. Peirce has either overlooked in Kant these passages, or, if he has read them, he has never taken them to heart.—

Mr. Peirce objects to my statement that according to his philosophy the domain of mind is characterised by absence of law. He argues: "Is not one of my papers entitled 'The Law of Mind?'" Yet this law of mind, he states two lines further on, "requires its own violation." (P. 552.)—

The "sporting" of the primeval chance, Mr. Peirce says on page 552 of this number, is "not undetermined and indeterminable," because "its ultimate result must be an entire elimination of chance from the universe." Shall we understand that the "arbitrary sporting" of the primeval chaos, with which Mr. Peirce (according to *The Monist*, Vol. I, No. 2, p. 175) begins his cosmogony, was determined? If absolute chance is determined, why not call such a philosophy "determined Indeterminism"? We try hard to understand Mr. Peirce, but sometimes we really have to give it up.—

Physiology teaches that memory alone changes feeling into consciousness, but the consciousness of Mr. Peirce's original Chance is without memory and habit.—

Chance, a being living and conscious, has, according to Mr. Peirce, created the world, but the ultimate result of evolution must be an entire elimination of Chance from the universe. Thus it appears that the creation of the world is an act of divine suicide. The world-process is a slow degeneration of God, finally ending in his complete annihilation.

RETROSPECT.

In summing up the result of the whole battle, we find that there is not a single question on which we have to yield or even modify our position. Our position remains the same, while Mr. Peirce's position has become glaringly untenable. There is one point, however, in which justice demands that we should recognise that he is right. I should not have called Hamilton "Mr.," but "Sir William." I can, however, assure Mr. Peirce that this mistake

of mine (which in all my allusions to Hamilton occurs only once) was a mere slip of the pen; it was not ignorance on my part and still less was it any disregard of the rules of politeness.

We are obliged to reject the favorite ideas of Mr. Peirce, and have only to add that our esteem for him has not been lessened, in spite of all disagreements, and notwithstanding the flaws we have detected in his reasoning. On the contrary, our admiration for him as a dialectitian has been greatly increased, for, in truth, we have never before seen propositions so untenable in their nature, so odd and almost bizarre, as those of "absolute chance," of "matter as effete mind," of "feeling as being the inner aspect of chance," and of "real growth as opposed to the conservation of energy," defended with greater adroitness.

Mr. Peirce is unusually familiar with certain branches of learning, of which he has made a specialty, and also with general philosophy; but he has original ideas, and he prizes them too highly. Where he makes no use of his originality, he does extraordinarily good work. Thus, most of his papers on logic, published in sundry magazines, are, in their critical as well as constructive parts, strictly scientific and almost free from apocryphal speculations. Only slight hints in them have been a puzzle to me and other readers of his essays. Of late, however, Mr. Peirce has come out more explicitly with his peculiar philosophy, and we regret to say that the more he allows his original ideas to enter into his thoughts, the more warped are his theories.

While we regard Mr. Peirce's original ideas as erroneous, we must say that they are nevertheless highly interesting and stimulating. His propositions are presented so vigorously, so attractively, so brilliantly, that while perusing his articles, we find them remarkably suggestive; we enjoy them as we do poetry. They read like a romance of the origin of the world or a fairy-tale of metaphysics.

Mr. Peirce's views should receive the consideration of all earnest students of philosophy; for he goes to the root of its main problems, and his very errors are instructive.

EDITOR.