Fate and Freedom[1]

by Alfred Korzybski

IN THIS LECTURE I propose to analyze the principles on which the foundation of the Science and Art of Human Engineering must rest, if we are ever to have such a Science and Art.

As my aim is merely to offer a somewhat rude outline, I shall, as much as possible, avoid the use of such technical terms as would be essential to the precision demanded by a detailed presentation.

By Human Engineering I mean the Science and Art of directing the energies and capacities of Human Beings to the advancement of Human Weal.[2]

All human achievements are cumulative; no one of us can claim any achievement exclusively as his own; we all must use consciously or unconsciously the achievements of others, some or them living but most of them dead.

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[1] An address delivered before the joint meeting of the Detroit Mathematics and Detroit History Clubs. January 11, 1923; before the Mathematical Club of the University of Illinois, January 12; and at the University of Michigan, January 15, 1923. *(To improve the legibility of this e-booklet, the punctuation and typography have been modified slightly and the figure has been redrawn. The footnotes have been provided with hyperlinks.)*

[2] *Manhood of Humanity: The Science and Art of Human Engineering,* by Alfred Korzybski. E. P. Dutton. New York City. (At Amazon.com. Also on-line at http://www.esgs.org/uk/art/manhood.htm.)

Much of what I will say has been said before by many others.

It will be impossible to give a full list of authors but the names of a few stand prominent; two Englishmen, Alfred Whitehead and Bertrand Russell; one Frenchman, Henri Poincaré; one American, Professor Cassius J. Keyser; one German, Albert Einstein. I will largely use here their ideas, methods and language, as my main concern is the practical application of some of their great ideas. It would be very difficult to acknowledge fully all I owe to these authors; yet anyone acquainted with the literature of the subject will recognize my obligations, which are heavy.

The term Engineering, in its generally accepted meaning, I take as derived from the Latin ingenium, cleverness, that is, designing, constructing, building works of public utility. As a matter of fact, there does not as yet exist a science of human engineering. The semi-sciences such as sociology, economics, politics and government, ethics, etc., are supposed to deal with the affairs of man, but they are too hopelessly divided and have not as yet emerged from the mythological prescientific era.

If there is to be a science of human engineering, it must be mathematical in spirit and in method and if we do not possess methods to apply mathematical thinking to human affairs, such methods must be discovered. Can this be done?

Let us say a word about what has already been accomplished in this direction. The latest researches in the foun-

dations of mathematics, chiefly accomplished by Whitehead, Russell, Poincaré and Keyser, have disclosed the insufficiency and fallacies of the traditional logic and have produced an internal revolution in logic and mathematics. Mathematics and logic have been proved to be one; a fact from which it seems to follow that mathematics may successfully deal with non-quantitative problems in a much broader sense than was suspected to be possible.

Let me recall a delightful mathematical joke. A distinguished mathematician, I do not recall his name, produced some very pretty but very abstract mathematical work. He being intensely disgusted by the commercialization of science, wrote to a friend: "Thank God, I have finally produced something which will have no practical application." The irony of life is that a few years later, his discovery was applied to some branch of physics with great results.

That is what is happening now in another field. Engineers are getting hold of some of the latest, very general and very abstract, discoveries of mathematics and are trying, with increasing success, to apply them to the ordering and direction of human affairs.

Somewhere I read in a review of a book written by one of the scientists I have just named that, not all in the book is "real mathematics." I am not convinced that the writer of this review meant what he said. Every growth of mathematics, be it in the superstructure or in the deepening of the foundations, is "real mathematics," if those words are to

have any significant meaning.

It is true that such familiar concepts as "sine," "cosine," "derivative," "integral," "graph," and the like, have, for the time being, a subordinate importance in human engineering; but, as I conceive it, mathematics is not limited to such concepts; it embraces many others, such as existence, class, type, dimension, order, limit, infinity (Cantor), non-existence of metaphysical infinitesimal (Weierstrass), invariant, variable, propositional function (Russell), doctrinal function (Keyser), the physico-mathematical theory of events and of objects (Whitehead) and the relativity of space and time (Lorentz, Minkowski, Einstein, Whitehead), etc. These concepts are of immeasurable import, for without them the foundations of human engineering could not be laid.

When I speak about the relativity of space and time, I do not refer to Einstein Theory alone. I use the term here in its broadest meaning as generally accepted in science, namely that absolute space and absolute time do not exist. The work of Einstein is very important, yet it seems to me that the theory of the relativity of space, time and *matter* as elaborated by Whitehead is more comprehensive and is more directly applicable for our immediate purpose.

Before proceeding further we will have to establish a vocabulary for our mutual understanding. Human engineering, if such a branch of science is to exist, must be democratic—dealing with all mankind, and its outline must be clear. I will sacrifice minute precision to general clarity.

No matter where we start, we must start with some undefined words which represent some assumptions or postulates. We see that knowledge at every stage presupposes knowledge of those undefined words. Let us call this fundamental fact the "circularity of knowledge." Words written or spoken and mathematical symbols are like signs, labels, which we attach to ideas, concepts corresponding to our experience.

"The concrete facts of nature are events exhibiting a certain structure in their mutual relations and certain characters of their own. The aim of science is to express the relations between their characters in terms of the mutual structural relations between the events thus characterized. The mutual structural relations between events are both spatial and temporal. If you think of them as merely spatial you are omitting the temporal element, and if you think of them as merely temporal you are omitting the spatial element. Thus when you think of space alone, or of time alone, you are dealing in abstractions, namely, you are leaving out an essential element in the life of nature as known to you in the experience of your senses. . . . What I mean is that there are no spatial facts or temporal facts apart from physical nature, namely, that space and time are merely ways of expressing certain truths about the relations between events. . . . To be an abstraction does not mean that an entity is nothing. It merely means that its existence is only one factor of a more

concrete element of nature."[3]

The dynamic theory of "matter" alone (I omit other considerations) makes it obvious that we can not *recognize* an event because when it is gone, it is gone. Yet our daily experience tells us that amidst events there is something which is fairly durable, which we can recognize from day to day. Things which we can recognize are called objects. A label attached to an object is called a word. The meaning of a word is a complex notion; for our purpose we may say that the meaning of a word is actually or potentially given by a definition.

Here we must take into consideration a grave fact. The above mentioned mathematicians have introduced a new concept which they stress very justly. Not only do they distinguish between true and false propositions but also recognize the existence of statements which have the form of propositions, but which are neither true nor false, but are meaningless. These meaningless verbal forms should be of great practical concern because our daily language and even some would-be theoretical disciplines are interwoven with meaningless statements. It often happens that such a meaningless statement is designated by a special "noise" which can be reduced to a combination of letters giving it the semblance of a word. Obviously this noise is equally meaningless, even though volumes be written about it.

And now we are approaching the central problem of all

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[3] *The Concept of Nature,* A. Whitehead. pp. 167, 168, 171. (At Amazon.com.)

human knowledge. A sign or a label, if attached to nothing is a pseudo-symbol which symbolizes nothing; that is, it is not a symbol at all but is merely a noise if spoken, or blotch of black on white if written. Before a sign may acquire meaning and therefore become a symbol there must *exist* something for this sign to symbolize. The problem of existence has several aspects and is extremely important though not all of these aspects concern us at this stage. Poincaré defines *logical* existence as one free from contradiction. Russell derives existence from his theory of propositional function. "If $\phi(x)$ is sometimes true, we may say there are x's for which it is true, or we may say 'arguments satisfying $\phi(x)$ exist.'" Russell's conception is much more fundamental, but for the time being, Poincaré's definition will be sufficient.

As we observed before, events, in the Whitehead sense, cannot be recognized, but the things we can recognize are called objects. An event is a very complex fact, and the relations between two events form an almost impenetrable maze. Events are recognized and labeled by the objects situated in them. Obviously an object is not the whole of the event, nor does the label which symbolizes the object cover the whole of the object. It is evident that everytime we mistake the object for the event we are making a serious error, and if we further mistake the label for the object, and therefore for the event, our errors become more serious, so serious indeed that they too often lead us to disaster. As a matter of fact, we all of us have from time immemorial

indulged in this kind of mental stultification, and here we find the source of most of the metaphysical difficulties that still befog the life of man.

In his last book, *Mathematical Philosophy,*[4] Professor Keyser stresses the importance of recognizing that mankind is under the rule of logical fate. The concept of Logical Fate seems to be self evident when stated; it essentially means that from premises consequences follow. But the moment this is analysed with a full awareness of the circularity of all human knowledge those few words gain the significance of a discovery and formulation of a neglected law of immeasurable importance. By laws I mean propositions asserting relations which have been or can be established by experiment or observation.

The few first words with which mankind started its vocabulary were labels for prescientific ideas, naive generalizations full of silent assumptions, objectifications of non-existents, and our ignorant ancestors began to impose upon nature their naive fancies, which were mostly arbitrary. Sad to say, we continue to do the same in a great many fields.

Our daily speech and in very large measure our scientific language is one enormous system of such assumptions. The moment assumptions are introduced, and it is impossible to avoid them, logical destiny begins its work; and if we do not go back all the time, uncover and discover our con-

[4] E. P. Dutton. (At Amazon.com.)

scious or unconscious fundamental assumptions and revise them, mental impasses permanently obstruct the way. The history of human thought gives us many examples. One single concept, one generalization, be it meaningless (dealing with non-existents) or loaded with significance, gives rise to whole systems of thought—absurd or wise. Most of the false theories in the world are not so deficient in their reasoning as in the assumptions and concepts about which they reason—concepts that are vague, false to facts and often deal with non-existents.

Allow me to give an example in the wording of Whitehead. This example alone is enough to emphasize the exceeding importance of mathematics in the clarification of our mental processes.

"Aristotle asked the fundamental question, What do we mean by 'substance'? Here the reaction between his philosophy and his logic worked very unfortunately. In his logic, the fundamental type of affirmative proposition is the attribution of a predicate to a subject. Accordingly, amid the many current uses of the term 'substance' which he analyzes, he emphasizes its meaning as 'the ultimate substratum which is no longer predicated of anything else.'

"The unquestioned acceptance of the Aristotelian logic has led to an ingrained tendency to postulate a substratum for whatever is disclosed in sense-awareness, namely, to look below what we are aware of for the substance in the sense of the concrete thing. This is the origin of the modern scientific

concept of matter and of ether, namely they are the outcome of this insistent habit of postulation . . . what is a mere procedure of mind in the translation of sense-awareness into discursive knowledge has been transmuted into a fundamental character of nature. In this way matter has emerged as being the metaphysical substratum of its properties. . . . Thus the origin of the doctrine of matter is the outcome of uncritical acceptance of space and time as external conditions for natural existence . . . What I do mean is 'the unconscious presupposition of space and time as being that within which nature is set.' "[5] Otherwise absolute space and absolute time.

It becomes clear now, that "logical destiny" is a law which works within us consciously or unconsciously. Our language as a whole may be regarded as a vast system of assumptions and potential doctrines with *fixed logical boundaries.* It was built with the metaphysical background of metaphysical infinitessimals, metaphysical infinity, absolute space and absolute time. A great many of the most important terms like change, continuity, cause and effect, moment, duration, etc., present a not only perplexing but insoluble problem because of the silent assumption of the existence of those non-existents. With the mathematical clarification of a very few of such fundamental concepts we may confidently expect that many of our difficulties will vanish, that the universe will

[5] A. Whitehead: *The Concept of Nature.* pp. 16, 18 ff.

become correspondingly intelligible, and man correspondingly intelligent.

Professor Keyser's "doctrinal function" reveals the inherent structure of doctrines and, therefore, in a large measure, of language and teaches us the methods by which to judge and to revise them. The circularity of knowledge shows us the absolute necessity of constant revision of our assumptions.

Most of what I have said is hardly so much as a sketchy outline of a vast coherent system, due, in the main, to the recent work of the few mathematicians before mentioned. The sharp formulation by these thinkers of the conditions of knowledge and progress promise that the coming epoch will be more fruitful for man than any other recorded by history. When the mathematicians themselves digest this new material, they cannot fail to see their rôle clearly as the leaders of pure thought and consequently of human progress.

Thought, taken in its broad meaning, is a process. Man thinks with his *whole* being; this process is not clearly delineated; it starts somehow with hazy "instincts," "feelings," "emotions," and crystalizes itself in a concept. We cannot but see that any divisions that we make in the process called thinking, are *arbitrary* and often misleading, or even meaningless.

There are, however, two aspects of this great process with which we can deal in a rigorous fashion. I refer on the one hand to that great invariant called the laws of thought,

and, on the other hand, to those crystalized products of thinking which we are wont to call concepts. We should not fail to note that, at the various stages of this process, there is a striking difference in respect to what may be called its velocity. The velocities of so-called instincts, intuitions, emotions, etc., are swift, like a flash, while the analysis of the raw material thus presented and the building out of it of concepts and speech is slow. In this difference of velocity lies, I suspect, the secret of "emotions," etc. Unexpressed, amorphous thought is somehow very closely connected with, if not identical with, emotions. We all know, if we will but stop to reflect upon it, how very slow is the crystalization and development of ideas.

It is useless to argue which comes "first," "human nature" or "logic." Such argument has no meaning. "Human nature" and "logic" have their common starting point in the physico-chemical changes occurring in man, and as such, start simultaneously. We are thus enabled to see the supreme importance of concepts, which, as before suggested, are crystals of thought. Such crystals once produced, are permanent and they serve to precipitate their kind from out the supersaturated solutions of the emotions.

It is now evident that intellectual life is one long process of abstractions, generalizations, and assumptions; the three things are so many aspects of one *whole* activity. These processes materialize in symbols which we call words. We see also that all intellectual life is one vast (probably infinite)

system of doctrines and doctrinal functions in the making, inherently governed by logical fate. As Professor Keyser has said: "Choices differ but some choice of principles we must make . . . and when we have made it, we are at once bound by a destiny of consequences beyond the power of passion or will to control or modify; another choice of principles is but the election of another destiny." The disturbing and dangerous side of the question is that the great majority of mankind are unaware of the silent doctrines which govern them. They take labels, creations of their own rational will for objects, and objects for events as true constituents of nature, and they fight and die for them.

We have come to the point where mathematics and our daily language meet. They both of them operate with concepts which, in the last analysis, are disguised definitions, generalizations, assumptions. In this respect the concepts "a cosine" and "a man" are identical, neither "a cosine" nor "a man" physically exists (John Smith, or Bill Brown exists, but not "a man"). A cosine and a man are both conceptual constructions. The "a cosine" is defined consciously and precisely; the other term "a man" has *no* scientific definition; we are still in the caveman stage of confusion about this most important of all terms. Mathematicians are conscious of what they do; others are less so. That is why mathematical achievements stand better than any others.

Let me point to a fact which seems to me to be extremely important, and which I shall call the "Physiological point

of view of mathematics." We have seen that man has a great freedom in building up his abstractions. It happens that in mathematics the external universe has imposed the generalizations upon man, whereas, in the other disciplines, man has imposed his fancy upon external nature.

Let me explain a little. Modern mathematics deals formally with what can be said about anything or any property. Here it may be explained why mathematics has this exclusive position among the sciences. It must be emphasized that it was not some special genius of the mathematician as such, that was responsible for it. With the coming into existence of the rational being—man—rational activity began spontaneously (no matter how slowly) and this rational activity manifested itself in every line of human endeavor—no matter how slight such activity was. Today we know that we humans can know nothing but abstractions. The process of constructing abstractions is quite arbitrary. Since man began he plunged into this process of constructing arbitrary abstractions—it was the very nature of his being to do so.

Obviously, in the beginning, he did not know anything about the universe or himself; he went ahead spontaneously. It is no wonder that some of his abstractions were false to facts, that some of them were devoid of meaning, and hence neither true nor false but strictly meaningless, and that some of them were correct. In this endless spontaneous process of constructing abstractions he started from that which was the nearest to him—namely his own feelings—and ignorantly

attributed his human faculties to all the universe around him. He did not realize that he—man—was the latest product in the universe; he reversed the order and anthropomorphized all around him. He objectified his labels, mistook them for events, and became an "absolutist." He did not realize, and this is true even today in most cases, that by doing so he was building up a logic and a language ill fitted to deal with the actual universe, with life, including man; and that by doing so he was building for himself mental impasses. In a few instances good luck was with him; he made a few abstractions which were at once the easiest to handle and were correct; that is, abstractions corresponding to the actual facts in this actual universe.

These were numbers.

Let us see what was and is the significance of numbers. Any one may see that there are actual differences between such groups as * or as *, *, or as *, *, *, whatever the group was composed of, be it stones, figs, or snakes. And man could not miss for long the peculiar similarity between such a class * * of stones or such a class * * of snakes, etc., and here happened a fact of crucial significance for the future of man. He named those different classes by definite names; good luck saved mankind from his ignorant speculations; he called the class of all such classes as * "one," the class of all such classes as * * "two," * * * "three," etc., and number was born.

Here as everywhere else "le premier pas qui coûte"; num-

ber being created the rest followed as a comparatively easy task. Man could not long fail to see that if such a class * is joined to such a class *, he gets such a class * *, but the other day he had called such classes "one" and "two", and so he concluded that "one and one makes two"—mathematics was born—exact knowledge had begun.

Good luck combined with his human faculties thus helped him to discover one of the eternal truths.

The creation of number was the most reasonable, the first truly scientific act done by man; in mathematics this reasonable being produced a perfect abstraction, the first perfect instrument for training his brain, his nerve currents, in the ideal way befitting the actual universe (not a fiction) and himself as a part of the whole. Now it is easy to understand, from this physiological point of view, why mathematics has developed so soundly. The opposite can be said about the other disciplines. In the main they started with fictions, and even today the fictions persist, and bring havoc in the life of man.

Mathematics alone started aright!

To professional mathematicians all that I have said here may appear as platitudes hardly worth mentioning. I have taken the liberty of repeating them to show that this system of doctrinal functions, of pure thought, which we call pure mathematics (Keyser) has a direct and most vital application to all the other problems of man.

In order to deal rationally with any object, no matter what,

though it is not always possible, it is always desirable, to have an analytical definition of the object. In this case where the object is man, the importance of such a definition is absolutely indispensible for the obvious reason that the results of all our thinking about man depend upon what we humans think man is.

Without an analytical, sharp, and precise definition, no demonstration is possible. How can we hope to establish anything whatever about a term if we do not take into account its meaning, is conceptual content? Now the content is given by the definition and by it alone. No definition, no demonstration.

At the very outset of our journey we find a fact so astonishing—so shocking—that it takes some effort to admit the shameful truth. Man deals with man without a scientific definition of man. Some day treatises will be written on this subject alone and in such treatises the responsibility will be traced for this calamitous omission in the intellectual life of humanity.

A definition of man is, of course, the first concern of human engineering. How shall we define our object, man? We are told by the naturalists that an organism must be treated as a whole—that sounds impressive—but they have not told us how to do it. It seems that the traditional subject-predicate logic leads automatically toward elementalism, and that this organism-as-a-whole theory will forever remain pia desideria as long as we use the old logic. Yet this concept of the

"organism-as-a-whole" is extremely important for us, particularly in the dealing with man (see *Manhood of Humanity*), and all experimental evidence seems to prove that it is correct. We are told on the other hand, that the organism is too complicated to be treated mathematically. It seems to me that these two statements are incompatible. Of course, it is true that, if we pursue the elementalist's point of view, then the organism is too complicated; but, if it is a "whole," then, if a proper generalization is found, the "organism-as-a-whole" *could* be treated mathematically because we could deal with this one generalization. By definition I do not mean a nominal definition which is merely the fixing of a name, a label to an object, but that analytical definition which will enable us to make the greatest number of general and significant assertions. Let us see how we could define man. Man, among all living beings, is the only one which has a chin; this characteristic is unique. Also he is the only mammal having no tail.[6] We could, if we chose, define man as a "chinful" or "tailless" mammal; these definitions would comply with the minor conditions for a real definition but they would not comply with the major condition, without which a definition is not a real definition, namely, it would not give important logical results. These examples alone show that we could define man in a great many ways, yet the definitions would

[6] Since the delivery of this lecture the author has seen pictures of a savage tribe with tails. This fact, be it a fact, does not alter the argument.

be practically worthless or fruitless. It is simpler by far to find out by reflection, what are the terms in which an ideal definition of man should be made, and a definition which would, if possible, give us the "organism as a whole."

To find such definitions is not difficult, but what is extremely difficult is to have the moral courage to admit the sad fact, that, in spite of all advancement of science, man—the creator of science—deals with man on the old mythological base.

If we go back to our schoolbooks, we will find in an old edition of the *Elements of Logic* by Jevons-Hill, published by the American Book Co., in 1883, just 40 years ago, that: "It is necessary to distinguish carefully the purely logical use of the terms genus and species from their *peculiar* use in natural history. . . . If we accept Darwin's theory of the origin of species, this definition of species becomes entirely illusory, since different genera and species must have, according to this theory, descended from common parents. The species then denotes a *merely arbitrary* amount of resemblance which naturalists choose to fix upon, and which it is not possible to define more exactly. This use of the term, then, has *no connection whatever with the logical use . . .*" (page 230–231, italics are mine). Surely blind prejudices are still active, and they are doing their work thoroughly, because, as yet, the need for a scientific definition of man is still ignored.

To perform our task we will have to observe, and think, and this little old book of logic at once gives us the valuable advice that: "Nothing is more important in observation

and experiment than to be *uninfluenced* by any prejudice or theory" (page 207, italics are mine).

Just that is the first great obstacle in our path, for since our birth, we have been fed with mythological, fundamentally false ideas about the distinctive nature of man. The struggle to overcome this will be hard, as all possible odds are against us and a free independent logical issue. Once this clearing of the way is accomplished, and I know too well how difficult it is to free oneself from prejudices, nothing of importance stands in the way.

The ideal definition for man would be a definition in the same terms in which, in the exact sciences, we have attempted the formulation of the universe around us. The benefit of such a definition would be, that it would be in familiar terms and would keep man logically inside of the universe, as an actual part of it.

Observing living beings, we find that the plants bind solar energy into chemical energy, and so we may define plants as the energy or chemistry-binding class of life. The animals have an added mobility in space—they are the space-binding class of life. Humans differ from animals in that each generation does not begin where their respective ancestors began; they have the faculty to begin where their ancestors left off; they benefit by and accumulate the experiences of all the past, add to it and transmit it to the future. Man and man alone is active in a peculiar way in what we call time—so we must define man as a time-binding class of life.

The above definitions are self evident when stated. Here we must at once make clear that we have to use a static language to cover the dynamic march of events. The classes of life overlap but so do the physical, "matter," "space," "time" overlap. So in our definition we are true to facts. Matter, space and time which do not overlap are abstractions and abstractions only, and I use them *as such*.

It is easy to see that this definition of man is unique. Beyond doubt animals did not produce civilization—man did, and he was able to do so because, and only because, of his capacity to bind time. Here we get for the first time, the logic of the "organism as a whole" as applied to man and the affairs of man. To produce this long desired logic, a new concept, a new generalization was needed.

Heat is measured not by heat but by the effect of heat; in the same way, by this new generalization, a mathematical treatment of man becomes possible, by the analysis of man's activities. This leads to the exponential function of time PR^T as given in the *Manhood of Humanity*.

Now what of the logical fertility of this definition? The consequences of it far surpass our most sanguine dreams, the details of which are to be found in my book I mentioned before. I will mention here only a few.

The law of the survival of the fittest remains true, but true in the proper type or dimension; survival of the fittest in space is a natural law for space-binders. Physics tells us that two bodies cannot occupy the same space at the same

time, and, therefore, the survival of the fittest in space—the obvious law of animals—means brutal fight where the strongest, most ruthless, survives. With the time-binder the same law takes on an entirely different aspect. To be a natural law for time-binders it must be the survival of the fittest in time. Who indeed "survives in time"? The strongest or the best? Here at once we come to a foundation on which scientific ethics can be built.

A short inquiry will easily reveal that most of our civilization hitherto has been built upon the generalizations taken from animal life. This man-made civilization was an "animal" civilization because of the fundamentally wrong ideas man had of himself.

This definition also complies with the mathematical theory of logical types or, as I prefer to call it, the theory of dimensionality. It is obvious that animal and man are different types, they are of different dimensionality, as different factors enter which make them distinct. The realization of this makes it obvious that no rule, no generalization taken from animal life, will apply to man any more than rules of surfaces will apply to volumes. If we confuse our types or mix our dimensions in reasoning about man, his structures (called civilization, in this case) must collapse every little while; just as a bridge built on false formulas, would collapse. All the tragic history of mankind proves that this conclusion is true. Man is not a mixture of beast and angel, but man is man, and must learn to think of himself as such. Professor

Keyser in his *Mathematical Philosophy* has done me the honor to devote a chapter to the new concept of man. I am frank to say that it is the best analysis of the concept in existence. He made here an important addition, namely, that for animals it matters what animal is; for man it matters not only what man is, but even more what man thinks man is. *One* factor for animals, *two* factors for man.

These simple but undeniable observations at once prove that the fashionable school of behaviorists is perfectly scientific in respect to all creatures below man. In respect to man, their doctrine appears fallacious. Their doctrine deals only and exclusively with what something *is*, how it behaves in the animal dimension; but it cannot deal in the same fashion, without grave error, with something in which two factors enter, namely, what this something is and what it thinks it is. It is the same as applying the rules of surfaces to volumes; this would be poor mathematics; all our bridges would collapse in the same way our social structures recurrently collapsed, because built upon a false conception of human nature.

It does not really matter much if the definitions as given here will survive for long, what matters and matters much, is the fact that we see clearly our neglect and the new and fertile fields now open for inquiry. The theory of time-binding is the study of the "behavior" of man, and man alone, but in its proper dimension, true to facts and free from logical confusion.

The old civilization is crumbling. The new will require a

complete revision of old fallacies and prejudices, and most probably mathematicians, who are today the best logically trained men, will be very active and productive in this coming reconstruction of science and life. A thorough going scientific revision will lead to a complete reversal of many traditional beliefs. It will be found that the belief in the existence of non-existents such as, metaphysical "infinitessimals," metaphysical "infinite," "absolute space," "absolute time," is very wide spread; indeed it embraces practically the whole of humanity. This has been taught to us since our birth; it is even taught in some schools and universities today by such expressions as "matter is that which occupies space," and similar fallacies which fatalistically lead by the law of logical fate, which applies to all, educated or non-educated, civilized or non-civilized, to a world conception, contrary to human nature. Such conceptions are deadly, they lead to mental impasses, making man feel hopeless and helpless in a hostile and strange universe; he rebels and this leads him to mystical and mythological delusion, which also fail him. This feeling of hostility all around him transforms him into a hostile being, and the antique proverb: "Homo homini lupus" is too often a bitter, yet entirely logical consequence of the silent or conscious assumptions of the truth of fundamental fallacies.

Yet the actual universe is *not* hostile; it is at most, indifferent. The vicious fictions, the abuse of his power to assume, to abstract, to generalize and invent non-existents has viti-

ated the whole outlook of man, in all fields. Man saw that animals fight and he imposed upon himself "fighting" as the "manly" art, and blinded by his prejudices and vicious logic he did not stop to think that cooperation—which has been and is now artificially hampered—is the basic law of a *human, time-binding,* rational class of life.

Any inquiry into the above mentioned problems and their mathematical solutions will disclose that no branch of human knowledge has ever contributed more to humanity than the mathematical inquiry into mathematical foundations. The psychological transformation will be complete. Man will understand himself. Needless to say that the semi-sciences will be transformed into sciences.

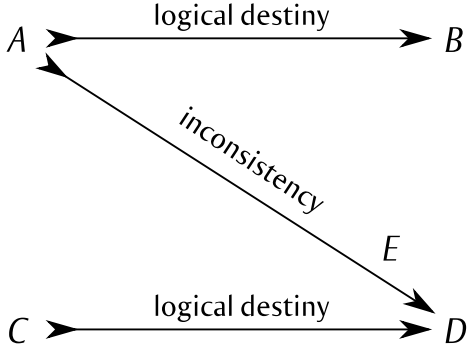
A new school of history will arise which will show to mankind what disasters the wrong conception of man by man has wrought to mankind. Philosophers will compile charts of "logical destiny," showing what consequences one concept, one abstraction, one generalization have brought to us. This probably will bring mankind to its senses, and this will probably start the true reconstruction of science and life.

Allow me to summarize my lecture and try to justify its title. Mathematical discoveries of the last few decades, culminating lately in the works of Whitehead, Russell, Keyser and Einstein, have made us conscious of the power of rigorous thought and have also disclosed the inner structure and working of this subtle instrument called human thought.

They have proved and it has been ultimately formulated by Keyser, that human freedom is not absolute; that we are governed by logical fate. We are free to select our assumptions; if we select false assumptions, disasters follow. But to exercise this freedom, man must first know that he is thus free; otherwise he will continue to accept false assumptions, the old language, etc., as final "innate ideas," etc., without realizing that the moment he does so, he renounces the freedom he has, and becomes the slave of logical fate of his creeds.

This also explains why mankind is divided into so many fighting factions. We are not conscious of the silent, often false assumptions which underlie our language and actions, how do we expect to prove anything to the satisfaction of all if we do not possess a scientific definition of man? As was said before: No definition, no demonstration, no demonstration, no agreement possible.

A diagram may help the visualization of these few ideas.



If we start with *A*, as most of us do, we can *not* reach *D* and convince all, because inconsistencies *E* arise which prevent the universal acceptance of some high-sounding but logically unsound doctrines. If we want to reach *D*, the new and truer theory, we must start with new and more fundamental, truer premises. In order to know which are truer we *must first investigate them*, without being shy about it.

No doubt mathematicians, and those who have mathematical training are the best fitted for this work. There are signs that this work has already been started, and indeed, nothing could be more important for the future of man. ❖