September 7, 1952

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First extemporaneous lecture by Franklin Merrell Wolff of the Holistic series dealing with a method of the supgamental descent.

This evening we shall discuss further the subject of the sup@mmental descent, bringing in, before we are through, reference to a possibility that has not been considered by us heretofore; but this is done in order to secure a context so that everyone may reasonably understand the daring of this enormously important conception. We will first introduce our material through establishing briefly the context in which it lies. We shall not take time to develop the reasons or the grounds whereby this context is known, but shall simply sketch it.

The field or process in which our lives and our consciousness are cast, we shall designate the evolution. This that we call the evolution is marked by certain characters that clearly define it, though not necessarily exhaustively. First of all the evolution is marked by the character of change or flux--a constant process--, however it is not simply senseless and random change, but change having a certain directedness. Western man, since the time of Darwin, has become familiar with the conception of an organic evolution which has gradually been extended into the notion of a cosmic evolution. While this was the recovery of an ancient knowledge, its interpretation was very inadequate. It was considered as a process that had no purpose, no essential directedness, but one that was moving automatically. We shall abandon that point of view from

the outstart. Directedness is the only thing that gives to the evolution some meaning. While we can detect causes or changes of phase and differences in various stages. nonetheless, we cannot imagine that there was ever a beginning of evolution in time, nor can we conceive of a point in the future when evolution shall cease to be. Periods of rest, there may be, but within this field, process is the law--movement--, a becoming something other. The rate of this movement is not the same for all phases. for some components are so stable that, relatively, they may be regarded as constant. Mountains do not change their configurations enough for the process to be very discernible within the span of a lifetime, and even less is the evolution of the stars noticeable within the limits of one life or in the span of all recorded history. But whether fast or slow, change in the field of evolution is eternal. It takes a very subtle observation to discover the authentically stable or constant. The relative constants upon which our sciences are dependent, so that they may gain understanding and then control of this ceaseless change, are not true constants, at least not in most cases, but rather are what we call in mathematics, parameters--relatively constant with respect to other changing factors.

In contrast, and as the other of the evolution, there is the Transcendent, the character of which is marked by the quality of permanency. It is that state, or quality

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of consciousness, which is not time-conditioned and, therefore, not a consciousness of process. It is consciousness that serves as the container and support of both time and space and of all law that governs within the evolution. Man and, together with him, all creatures and all things are, in part--what we may call the empiric part--in the evolution, but also in another sense eternally in the Transcendent.

We can isolate certain stages, or certain principles, operating in a grand way in the evolutionary process governing man, and that is the part which will concern us tonight. Some of this process is continuous or by insensible gradation, but there are certain points which we might call nodal points, critical points or points of discontinuity, where there is a radical shift into the action of another Principle which had not been operating formerly. First of all, we see coming out of matter, some time in the relatively distant past, that which we call life, but it does not come out of matter as a purely mechanical operation -- something autonomous and blind--nor merely by the action of an occult and inconscient sort of intelligence in matter, but by a combination of this and a descent from the Transcendent, and out of the two--the mutual impingement of the two--, life emerges from matter, and for untold millions of years developed in this world, quite mindless, quite unintelligent, but guided by something like a half-conscious instinct, an insipient sentiency, but not awake. Thus, we

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have the vegetable kingdom, and the earlier forms of animal life. (There are several steps here, but I'm sketching only two or three). When the time is ripe, there is another emergence out of life, combined with a descent from above, and mind enters into the living being. Here is something which partially takes place in the animal kingdom, but in its main emphasis and its main impact, it is that which radically differentiates man from animal. Then during a cycle of many thousands of years, but not so long as the cycle of life before mind, there was an evolution, a development, an emergence into greater and greater liberation of mind. Even today, not only insofar as all animals, but also in respect to the vast mass of human beings, mind is not a liberated power, but is in a condition of great dependence upon life; a sort of hanging linga--to use a Sanskrit term--something dependent upon something else. But it acquires greater and greater autonomy in its action, more and more power to govern the life which gives it support on the material plane, and, at its peak, can achieve the power of self-determination, in high degree. This stage, which is realized only by the few in this human whole, is the furthest point of our present evolution in this world.

At each of these radical stages when there is a discontinuity, or jump, something descends from on High. The manifestation through which this descent is effectuated is

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what we call an Avatar, and by an Avatar we mean a Divine Incarnation. You may call it by some other name, that's not important. But it is an incarnation in any case of a degree of super-consciousness which is one with the Whole and, therefore, in its essential nature, Holistic. It comes down into the form or forms most fit for it, that have developed out of the earlier stages of evolution and then, breaking out the new possibility on that level. This sort of thing happens on a major and on subordinate scales, but it's because of this descent that we can detect points of radical departure or discontinuities leading into different orders in the stream of evolution. Now the office of the Avatar has this essential characteristic, that the descending consciousness which is mated with the incarnate entity, is so obscured that the empiric representative vehicle in which the Avatar manifests has just precisely the powers and limitations of other entities of the same sort, save that a more developed individual is chosen. Thus in the case of man, the incarnation is a man who does not have any rare or miraculous powers, but simply the outer powers and limitations already possessed by non-Avatar humans. Then the Avatar breaks the trail of the new possibility by unfolding the resources and the potentials that are in the human entity, so that the new potential manifested is therefore something which the humanity that follows can, in principle,

duplicate--the trail-breaking having been done. Parenthetically, I might make a note here concerning a great and damaging error which has grown up in Christian doctrine in its interpretation of the Divinity of the Christ. This idea is that the Divinity of the Christ is unique, having never occurred in the case of another being, and thus the power was strictly miraculous. Consequently, the Christ is not like another human being and He worked with powers that no other human being had or could have and, therefore, he could do things that no other human being could imitate successfully, and the consequence of that interpretation has been that often the Christian has Theresaid: "It is impossible to live the Christ life. fore believe on Him and He will save you regardless of your ethical conduct." Do you all see the damage that comes from interpreting the Avatar as exemplifying a miraculous power? It leads to one saying: "I cannot do likewise." Whereas, the very office of the Avatar is to show that it is possible for the man who has reached the critical point in his evolution to do likewise; and the Avatar fails in his mission if man doesn't learn that lesson. Once the trace has been established in what we might call the collective psyche of the earth, man can follow and can win into the new possibility and become the new kind of entity.

This sketch brings us up to our present point in

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the evolution. Admittedly it is too brief, and not sufficiently filled-in to make it convincing. If you're laboring under the necessity of being convinced, just take it as the context from which we enter upon the next step. Now if you study each of these steps you will observe that they separate off radical demarcations between the different kingdoms of nature. There is the mineral, there is vegetable life which consists of a mineral part and a living part; and there is the animal, consisting of a mineral part, a part like the vegetable -- as in its hair -- and a part that goes beyond that, the first faint glimmerings of mind. In man we have a mineral part--bone--, a vegetable part--such as hair--, we have an animal part--such as our gross physical bodies--but pre-eminently, as a distinguishing mark, separating man from the animal kingdom, even more fundamentally, perhaps, than the animal is separated from the vegetable, we have a mental nature that is of the conceptual order, and is capable of doing what was not possible heretofore, i.e., consciously recognizing the evolutionary process and turning upon it and, in some measure, aiding it, or, in some measure, working against But because man can aid the process, can add someit. thing of a self-conscious directing, there is a speedingup in the process.

In the next step this office of a consciousness directed upon the process becomes immeasurably more important and, therefore, that which took millions of years

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and thousands of years, may take only centuries until we can be aware in this world of a new departure. That new departure, in its initial stages, is upon us now; not yet recognizable, not yet differentiated into a new type of being which will contrast with mental man--homo-Sapiens-as radically as homo-Sapiens contrast; with the animal. Nay, indeed, more radically. Not perhaps, at first, at any rate, so much in the visible structure as in the essential mode of consciousness and powers, which after all measures the differentia far more fundamentally than mere anatomical difference. It is difficult to pick a name for that which will be other than mind and life and body, and yet is not the Transcendent, though something close to the Transcendent, and which enters the evolution as an active power, a manifesting power, that can define a visible being in this world. It is difficult to find a name, a word, that would indicate that, because it is not a present experience. The word supermind has been suggested, but that is merely a general term meaning something above Mind. We could use other words, maybe in time we will find something that will differentiate a little more clearly. This principle can easily be missed, even in the profoundest realizations. That is the reason why reference to it, except in our own time, has been rare and veiled. I will explain some of this.

When one passes through the process of a transforming

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realization, or rather a liberating realization, after he reaches the highest apex to which his individual consciousness can go, if he is successful--I'm not going into the technique of this--then somewhere or other there must have been a radical self-surrender or the equivalent of self-surrender, the abandonment of the ego. The way is generally difficult, but I am not concerned with that at the present time; I am just pointing out that a certain effect follows. There is an inversion of consciousness, a turning about at the deepest seat of consciousness. Its movement of consciousness instead of being outward, plumbs to profound depth. In a consciousness of Supernal Light there is, at the radical point, not only a vanishing of the seen world, a silencing of the feelings or what we call the affections, and a quieting of the activistic nature, the willing and the desiring, but thought stops, concepts dissolve and vanish, and there's a plunge into the Eternal Silence where all consciousness of the evolution tends to vanish like a dream that is beginning to be forgotten; and this is Liberation, this is the Enlightenment of which the Buddhist speaks. A finite consciousness has been dropped and there is an immersion into an illimitable, nay, an infinite Sea of utter Completeness, Fullness, Satisfaction, and Bliss, and Light taking the place of formed knowledge. Now in this transition, if you will notice, there is an immediate step from an apex

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position of mental consciousness into Silence. Is there anything between? Here we have found in this outline, apparently, only a blank between the Silence and the highest possibility of a relative consciousness. The evidence is that the bulk of Buddhism, the bulk of traditional Indian Yoga views this as the only possibility. But there are other realizations which can open up if one lingers on the borderline, and a glimpsing of another kind of power that is not mind or life or body, nor is it the Transcendent, but something between, close to the Transcendent, next to it, and reaching down meeting mind.

Now it is this something between that is the subject of our talk tonight, for which the temporary word supermind has been suggested. It is a principle that is dynamic, not like the Eternal Silence of the Transcendent, yet, fused with that Eternal Silence, so that its activistic character does not imply an obscuration of the awareness of the Transcendent, whereas every stage beretofore which we have passed in the evolution has involved such an obscuration. Upon all the planes of being, perhaps I had better say upon all the planes of consciousness, there are those beings, those entities, normal to the planes. They can be contacted by the appropriate means. Sometimes it is a very unhappy experience to contact the wrong level, but it is possible. And whenever there is a rising or an incarnation of a higher power in the earth field, there is a descent of some portion

of the beings native to the level of the power that is descending. Their fusion in the highest vehicle or vehicles here, which in our present time is evolved mental man, -- but not animal man, who will not be ready for a long time, and probably constitutes the vast majority of the millions of humanity--but an evolved mental man who has essentially reached his limit as man. Other things being ready, there is the potential, not only of a descending influence, but of an Incarnation. Descending influence we already have. If one observes subtly and in the right places he may see it, he may sense it. It descends as inspiration, it descends as a rare kind of insight, it descends as a peculiar power in consciousness, but always weakened and stepped-down, and not with anything like its native power. But I am speaking not of that kind of descent, alone, tonight, although that kind of descent is the necessary forerunner, progressively becoming stronger and stronger, before there can be an Incarnating Descent.

There is a certain characteristic of the supermind consciousness that differentiates it from what we have here already. It is integral, or as Dr. Waltmann would say, Holistic. (A Very good word). It is a consciousness that does not exclude in order to specialize in some particular field. Now this specializing has been necessary heretofore; it was part of the process of evolution. This specializing we have found necessary, on the mental plane

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in order to build our sciences, in order to build our philosophies and our technologies and our arts and all of our different activities into some degree of maturity and fin-But all of this is merely a preparation. It involves ish. a certain splitting in the consciousness that is valuable only in a transitory stage. The supermental Consciousness is Intelligence and Knowledge and, at the same time, Will, and also at the same time, Love, and the other qualities. To illustrate, if we wish to construct anything, such as an airplane, first we develop the idea technically through the engineering process of designs and specifications, the working out of mathematical requirements, and so forth, and then we add an effectuating department, which they call technically "the shop", where the effectuating will is dominant, casting into form, into tangible form, the idea which the engineer has developed. These are two acts, one separate from the other, performed not only at different times, but by a different personnel. Supermental Knowledge is at the same time an effectuation by the Will, that is, on its own plane. Of course, we will have to consider intermediate stages between what we have here now, and this, but I shall speak about this which is normal to the full supermental being. One thing that can be seen is that if knowledge is also effectuation, is also without separation, and filled with the values that belong to the affective side of our nature, so that it is a light, an

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action, and a devoted love at once, yet with the capacity to distinguish these three as modes which always work together with an inner interplay, then we can see that communication would become a very different matter from what it is now. One would communicate not by the mere idea of a manifestation, but by the manifestation itself. In the final state, language, in the sense that we know it, would no longer be necessary for communica-However, this we might view as the last term, the tion. ideal end of the series. The process of the descent involves a movement, slow, or rapid, depending upon the availability and the adaptability of the human material. It is a movement that is integral-Holistic, or towards that. It cannot be that in one fell swoop, it cannot be perfect instantaneously, for nature does not work that way. Nature works step by step even when she moves rapidly. It is like this: Suppose all of our work heretofore was like the building of a scaffolding, that is, all the work of life, of mind, was the building of a scaffolding, for the ultimate construction of a temple, the temple being the symbol of the incarnated supermind. Now, as we go up on that scaffolding and raise it level by level in the construction, we cannot suddenly jump to the peak and build up there, with a break in the scaffolding. Each level of the scaffolding rests upon the scaffolding below, Now this progressive building symbolizes a stepping-over

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of the consciousness, of the orientation of the consciousness, in such a way, that though at the end it is radically different from what it was in the beginning, yet, at no place has there been a violent break. It is like this: There is a story of a boy who had a knife which had three new blades, and two new handles. Yet it was the same old knife. Now if it had a renewed blade and a renewed handle, at the same time, it would not have been the same old knife. It would have become an entirely different knife; there would have been a break in continuity. But the continuity between the blades, the old and the new, is maintained by the handle common to both, and the continuity between the handles is maintained by the blade which they hold in common. So, somewhat similarly, we shift from what we were to what we will be without loosing our identity. A violent break would mean that one would have no connection in memory with all that had gone before. He would not be a continuation of the old character, the old self-identity; but by gradation, by approximation, step by step, holding a relative stability in one phase, while another is being transformed and replaced, he finally becomes, through a continuous process of consciousness, a totally new consciousness. That's the way of evolution; and so we have to bear in mind that fact when we come to play a conscious part in this process.

Some consequences we can see that are going to be

involved in the transformation. This particular kind of nervous system that we have--our cerebro-spinal nervous system--and the kind of organs that we have, delimit us in our possibilities, so that perforce with this kind of body we are specialists. It is said for instance that we have 10 billion neurons, with several banks standing in reserve to replace banks that may be injured. We do not begin to use all of these it is true, nonetheless, there is a definite restriction. There is guite a problem involved in the nerve traffic, that even more sets a limit rather than the number of neurons, so it seems. It is not possible for one of these human beings to combine all the knowledge of an Einstein, of a Bertrand Russell, of an Emanual Kant, of all of the sciences, and of an Aurobindo, in one head, or in one cortex. It cannot be done with this type of organism that we have now. To prepare then for the supermental descent we ought to envisage first, the case of a supermental being occupying a single body. The preparation for that is going to require a long time, because it is going to be a radically transformed body before the descent can become established and grounded and have an instrument through which it can act effectively. It may become a being that takes nourishment directly from the sources of energy, from the sources that the plant uses for instance, and not having to take it in the form of animal and vegetable food. This would result in a subtlized

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physical body and it would make many organs which we now have in the body unnecessary, with an atrophying of some, a replacement of others by organs which have functions we cannot now imagine.

All of this on the physical side; and, along with this, a reforming of the whole emotional nature and the whole mental nature, so that these are adjusted to the essential nature of the supermental being. In the analogue of evolution heretofore, the older powers would not be dropped, they would simply be transformed. There still would be something that stood in continuity with the animal body even though it be so radically changed that it would not be like anything we now call animal, there would be a continuation of the vital nature, but, again, so transformed that we would scarcely call it what we characteristically regard as human because it would be ego-less. It would be quite selfless, all embracing, compassionate, devoid of all those narrowing, restricting, compressing and explosive qualities that are such a marked part of the vital nature as we know it now. The mental nature would be transformed so that, instead of being mainly dependent for its knowledge upon an impact through the senses, it would be responsive to that which flows down from Knowledge, through Identity, or directly from the levels of Light, and would serve the office primarily of effecting a manifestation, rather than primarily an office of going forth

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for the purpose of discoveries, which is a very large part of the office of our intellectual mind today. There would be no more problems of discovery of Truth, of discovery of knowledge for, inwardly, in the depths, all knowledge would be already possessed. The process would be a rendering manifest or revealing, and not primarily a labor toward something that must be done, or a duty to be performed, or an effort for the earning of a living, and so forth, and so forth. No, not for any such reasons which dominate our lives now would our minds function, but for this pre-eminent reason: the delight of the manifestation for its own sake, for the purpose that the Divine may have the joy of revealing Himself to Himself. And so in one sense, in place of labor and serious work and duty, there would be the play or game of manifestation motivated by sheer Delight, done for its own reason. But this is an end term in the process of which we are speaking.

Now I think you can see that the preparation of an individual body, an individual entity, as a basis for the supermind incarnation is something that may take considerable time, and would require, on the biological side, certain radical mutations as a starting point. Now there is another possibility that can effect a partial achievement of the advantages of a supermental descent without waiting for this radical transformation, or for the radical transformation to be carried on sufficiently to give an initial effectiveness, and this other way is, what we may call, a collective incarnation. If there were selected from among this humanity, a group of individuals who had reached near to the top, if not the top, of their present egoic possibilities, and such a group were of such a nature that their functions were complimentary to each other so that there would be superior development in one direction in one, and superior development complimentary to that in another, and so on around, so that in the sum-total we secured something like a complex organ which, if played upon by a master supermental Being, would give supramental music, and this could happen in our own time. There is reason to believe that this may be the way--one of the ways at any rate--in which the supermental may effect its descent.

The need for the descent is vast. If one looks across the world problem today, dropping aside all rose-colored glasses and wishful thinking, looking clearly at its immensity and complexity, its inherent difficulty in all directions, this conclusion seems to be inescapable: the problem is too vast for mental man! We cannot go into that now, but we could show you something of its complexity if we had the time. Therefore, if this humanity, this evolution here, is not to perish and fall back into another primitive state and start the long climb up again, then this higher power must descend in at least the minimal degree necessary to effect the resolution of an almost impossibly massive problem.

Now, before all of you here, there emerge three possibilities of which you must choose one or the other. (1) You may, by the path of realization, rise to the point where you may enter the Transcendent and Its Eternal Peace, Calm, Silence and Fullness. (2) You may continue the path of ordinary man, content with the little and puny things that make up this life, and ultimately see yourself in a status, like that which the animal bears to us, in your relation to higher order of beings that will be coming. You will be an inferior creature, an inferior species. (3) Or third, by rising to the height of Realization and then voluntarily descending to play a part in the supermental labor, or else devoting yourself towards that goal directly, you may be a candidate to be one of the chosen. Those are the three possibilities. This is a serious matter. There is no time for dallying, for this is crisis, it is a time when choice must be made, when the ideas envisioned must be made real in the life.

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September 14, 1952 Franklin Merrell Wolff Lecture No. 2

This evening we are beginning the effort to bring into our consciousness something approaching a form for an Holistic symbol. It will occupy more than the time of this evening, at least one more night. It is true, I could give a formal or schematic statement in less time, but I wish to do more than that. I wish to carry our comprehension along and that will take a little more effort and a little more time. The symbol that we shall introduce at the end is a symbol for the Whole, or, using the new term. it is the symbol of the Holistic, in one dimension of its total meaning, that dimension being the vastitude, or vastness of the Whole. Now if we have the experience that the vastness which will appear before us tonight, and far more so on a week from tonight, is simply too vast for the Whole, I wish to remind you of this fact, that nothing within the Whole can produce a formation, conceptual or otherwise, that is vaster than that Whole. Whatever the totality is, it is beyond the greatest formation which can be envisaged in any way. There are two tasks before us; one is that of eliminating as far as may be, avoidable determinateness or appearance of determination, whereas a matter of fact, either our limited knowledge or the material with which we are dealing is not capable of such determination. As an example, of the first instance, most mystical experience, when formulated, is presented in the

form of far from comprehensible and largely indeterminate And while it is true that there is an irreducible thought. core of all mystical experience which is necessarily indeterminate, yet much of it can be rendered more determinate, more intelligible, than has generally been achieved so far. As a matter of fact, the logic which we seek to make evident bnight and next Sunday night, throws a great light upon the problem of rendering intelligible and determinate a portion of the contents of mystical experience. As an example of the second sort of instance, we have known mechanists who have approached the problem of life and imagined that they could formulate their knowledge with a high degree of definiteness or determinateness, and yet they were not justified in that, partly because their knowledge was inadequate and partly because the material is of such a nature that it does not lend itself to a strongly determinate formulation. Now if we look over the field of our consciousness we can divide it into three zones, one of which has a high order of determinate ness, and at the other extreme there is a zone of a high order of indefiniteness reaching to a complete degree of indeterminateness. But in between, there is a zone in which there is a degree of determinateness and indeterminateness at the same time. It is in this zone that we must deal with formations, conceptual or otherwise, that are only partly defined, partly delimited, but also in part, and often in the large part,

moving over into a field that transcends all determinations. But by achieving a degree of determinateness in this zone, we are enabled to achieve conscious orientation within it, we are enabled to do that which is in some measure analogous to navigation upon a sea.

Now if we can project ourselves back into that consciousness before number is born we can see the difficulties that would exist. How, in preparing a meal, would we be able to know when we had set out enough items. We know no number, we do not know whether it is six or seven or something else. The only thing we can do is set up a one-to-one correlation between one class and another and the very first class consists of the fingers. The number of fingers on both hands is therefore, and for that reason alone, the basis for the decimal system. Now when we came to the time when the number of our fingers was insufficient as when we were moving our herd of sheep composed, let us say, of 37 individuals or any other number that we could not count on the fingers of the hands, one very convenient device would be to pick up a number of pebbles and carry them in a bag and then correlate the first sheep with one pebble, the second with another, and so on until we have a collection of pebbles that establishes a one-to-one correlation with the sheep. We place these in the bag, and, if after the day at pasturing, we return and we set up the oneto-one correlation again and we have one pebble left over, we know that one sheep has not returned. One sheep may have been

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eaten by an enemy or at least lost, and without these pebbles we could not know that we had not all of our sheep. That method of counting existed not so long ago. The Romans used it, and hence we have the word "calculus", which means "stone". By the way, when I mention that word, if you are a doctor you probably think of something quite nasty inside the human being, but if you are a mathematician you think of that great instrument of calculation developed by Sir Isaac Newton and Leibnitz; the instrument that enables us to deal with motion by use of increments that are infinitely small. But the only reason why the word calculus comes to have that meaning and also is the root form of "calculate", is because back sometime among the Latin speaking people pebbles had been used for counting. That is not so long ago. Now the modern mathematical logician defines number in relation to this primary process, which we can trace back to the infant and the primitive. It is a one-to-one reciprocal correlation between two classes. Now if we have a class C which we may call the fingers or a bag of stones and we would correlate this with other classes, such as pictures on the wall, so that there is a one-to-one reciprocall correlation between them, and with other objects like books, like trees, like human beings, like stars, rivers, objects of art, and so on, so that there is a one-to-one reciprocal correlation between the class C and the various other classes, then number emerges as the symbol of that class C. Now that step leading to the emerging of

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number and then of writing signs in the earth, on rock, upon papyrus, upon our paper, that mean those numbers, represents a conquest in abstractions that called for genius. We do not know how long a time, how many centuries, were required for this stage in evolution. We know that even after the notion of number had emerged as a definite concept and it was being written, it took quite a long time before we evolved a scientific method of notation.

Perhaps few of us appreciate what a service our scientific notation is to us, but let me suggest to those of you who keep books, how would you handle your additions, your multiplications and divisions if you used the Roman method of notation; let alone calculating your income tax. Actually, it took great experts to handle calculations in that form of notation. Bookkeeping was almost a job for a genius. Once the idea of a limited number of symbols was established we had a real command of numbers. The notation does not have to be in the decimal form. The base could be other numbers, like number 12. There was one people that used the number 60. One very interesting form is based upon the number 2, inwwhich one uses only 2 symbols - zero and Actually that biennial system is the one that is used one. in the calculating machines, and so it proves to be the most scientific of all.

At last we have reached the point where number has emerged and we have adequate notation for it, and this has

given power. We have attained much command in our world, running through the whole of science, through the whole of our industry, through the whole of our finance and even involving our domestic accounting. All this is rendered possible because of the emergence of number.

Now, starting at the foundation which was so simple, we are preparing ourselves for an experience in soaring. We are not going to depart from the logical principle which the infant unconsciously employed. This is something which is grounded down in the very roots of our consciousness, and of nature itself. But it is going to lead to a vast elaboration of structure before we are through. We propose to enter ultimately the domain of the infinite, but in order to make that infinite more than just a word, first let us explore something of the meaning of the word finite. Many people use the word infinite in a loose and entirely improper sense. There were poets back in the classical days who spoke of the infinity of the stars, mind you this was before telescope, and the stars that could be seen were the only stars that could be meant and there were only 3,000 of them, so for those poets 3,000 was infinity. How many of you when you use the word infinity really mean infinity? How many of you merely mean a big number? A big number is not infinityly anymore than one is infinity. But we must become acquainted first with something of the larger meaning of finite before we can sail out into the illimitable sea and not do so wildly. Now,

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our universe is believed to be finite for certain definite reasons. One of them is that if there was an infinity of stars it can be proven that the whole sky would be as bright as the sun is. Another reason is based upon the theory of relativity which is the best integrating conception of the thought we know today relative to the physical universe. If we assume the Relativity Theory it is possible to come to some estimate as to the diameter of that universe. While this theory involves a complex notion of finiteness, yet. for a first approximation we will think of the universe as a sphere, with a certain diameter, not saying, or not meaning that it is literally such a sphere. Upon the basis of the theory of Einstein it is possible to state a good many facts or good many relationships that are implied by this theory concerning this universe. One of the problems which Eddington tackled was accounting of all the protons in the I do not mean he took a space ship out galactic universe. there and set up a one-to-one correlation with his fingers or with the stones. He calculated it indirectly. There is a specific number of protons in the universe, not more, not less, according to Eddington. This number is 136 x 2²⁵ which, when written out, goes to 80 places. Now you can challenge that number in one way, i. e., by devising a theory that is more successful in explaining the facts of the universe than Einstein's theory, and if you can do that you are good. I do not know how you would name this number

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which can be written in this short way, which defines exactly.

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Some time ago certain mathematicians made experiments with kindergarten children and in a very short time it was found that they were able to expand their consciousness to certain very big numbers, numbers bigger than a great many non-mathematical scientists are able to comprehend. The point is that this understanding is latent or innate and it can be guided to articulation or apprehension even in the kindergarten child. One of the kindergarten children wrote down 1 with a hundred zeros after it; a nine year old boy christened it the Googol. I have written out the googol (10^{100}) and here it is written out the long way:

This number has a hundred zeros while the Eddington number has 79 zeros. The Googol has 21 zeros more in it than a number of that order. That means it is 10^{21} times as big as a number representing all the protons in the galactic universe, a sextillion times larger. But it is a finite number, it is not infinite, and not any closer to being infinite than the number (1),is. Now here is where we are going to have some real fun. The nine year old boy gave the name Googolplex to the number raised to the googol power (10^{1000}). Now you get a real eexpansion.

We are going to see how much space it will take to write down that number. Let us assume that we have an unlimited supply of ticker tape. Then we start writing on it with zeros a quarter of an inch across. Now, I would like to have some estimates as to how long that ticker tape would have to be to write this number. Now you give us some estimates.

"A million light-years".

If you think he is too fantastic, tone it down a bit. How long would this tape have to be? You ----(Lady's comment - "To infinity".) You are going off the deep end. That is what we are guarding against. We are dealing with a finite number.

These estimates were given:

1,000,000 light years. 50 miles Around the earth, or 25,000 miles. Twice around the earth or 50,000 miles. As far as the sun, 92,000,000 miles. The diameter of the galactic universe, or 3,000,000,000 light years.

Of these estimates only the last approaches the order of distances required to write down a googolplex with the ordinary notion for writing numbers and using one-fourth inch for each zero. We shall proceed now to a computation of the space required to write down this number in this way.

Remember that a googolplex has 10^{100} zeros following the first digit. We shall give the following table of the number of zeros in certain distances giving only round figures for the larger numbers, since we are concerned with the order of size rather than the exact size of the number of zeros. One mile - 253,440 zeros

One light-second - 47,139,840,000 zeros One light-year - - 1,486,600,000,000,000,000 zeros Three billion light-years -

4,459,800,000,000,000,000,000,000,000 zeros If we assume that the distance across the galactic universe is on the order of three billion light years we find that if we had a ticker-tape which would reach across the galactic universe and return and assume some crowding of the zeros, we could write a number with the following number of zeros:

10,000,000,000,000,000,000,000,000 or 10^{28} . This would have to be multiplied by 10^{72} , or (1) with 72 geros after it, to reach 10^{100} zeros. It is obvious that if our ticker-tape were as thin as gold-leaf and only a quarter of an inch wide yet there would not be room enough in the whole galactic universe to write down our number. Now it must be borne in mind that we are not thinking of the size of our own galaxy, which is only 150,000 light years in diameter, but of the whole system of star-systems or galactic-systems which, it appears, is the finite universe in which we live. Relative to size of this sort great canons such as those of the Colorado or the Brahmaputra are scarcely more than the miscroscopic grooves formed by crawling baby worms on hard ground.

It has been estimated that if the entire galactic imoverse were packed tight with electrons and protons, the total number would be on the order of 10¹⁰⁰. So, 1f we reduced the size of our zeros until they were a little larger than protons and electrons, but smaller than atoms, we would just have space enough to write down a Googolplex. How long it would take to do this is another question, and any one who wishes may tackle the problem. Clearly the writing would have to be pretty rapid to be able to finish the task before the universe died.

The purpose of this exercise has been to show something of how large "large" can be and yet remain only finite. Numbers of this size are larger than those needed for the purposes of physics and astronomy, though larger numbers, even, are required to represent possible combinations in domains of large numbers of terms.

If we are going to secure some understanding of the meaning of the symbol of the vastitude of the Holistic that has been suggested, this magnitude we have just considered in the end must become so insignificant that it would scarcely make a watch-fob. You have got to be able to avoid swimming off the deep end with mere bigness. By finite numbers we may say we represent the possibility of all evolution, but an evolution developing throughout any finite time, however large, could not possibly exhaust finitude. We are seeking to transcend finitude with our Holistic conception. Now working with mere bigness is laborious, but by using other techniques it is not too difficult.

In as much as it is impossible to transcend mere finite bigness by the process of counting, however elaborated, then if we are to attain any assurance in the field of the infinite some other method or principle must be introduced. Such methods are a commonplace in mathematical operations but they are based upon a subtle logical principle, which may not be obvious at first to one who does not have the flare for mathematics or logical process well developed. The principle involved in these methods may be stated in the following form: "

"Any property or relationship which is proven as true of <u>any</u> member of a class, chosen in a way that is perfectly general, is, thereby, proven to be true of <u>every</u> member of the given class."

The logical principle is that "anyness implies everyness". This is not a principle that can be proven, but it is an ineluctible principle present in nearly all mathematical demonstration. In fact, without it mathematics would be impossible. But by means of it it results that the vast majority of mathematical theorems are valid with respect to an infinite number of specific instances. Thus, when the mathematician works out and proves the general or literal (meaning with letter-coefficients rather than with number-coefficients) solution of the equation of the second degree, he has actually proven the truth of a property valid In as much as it is impossible to transcend mere finite bigness by the process of counting, however elaborated, then if we are to attain any assurance in the field of the infinite some other method or principle **is** must be introduced. Such methods are a common-place in mathematical operations but they are based upon a subtle logical principle, which may not be obvious at first to one who does note have the flare for mathematics or logical process well developed. The principle involved in these methods may be stated in the following form:

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A special process, and one particularly important in connection with the mathematics of the transfinite, is that \sharp which is known as mathematical induction. Despite the name, which is something of a misnomer, this is a deductive and rigorous process, but proceeds from a finite specificity to

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an infinite generality. Since this process is so very important its seems appropriate to illustrate it by a simple application. Let us consider the problem of the summation of the following arithmetrical progression:

1+2+3+4+5+6 -----n First, we shall make a few specific additions:

1+2+3=6: 1+2+3+4=10; 1+2+3+4+5=15. 1+2=3; The second step might consist in in an examination of these sums and see whether we can find any relationship between the last or nth term, in each case, and the sum which is constant. ¹t will be readily noted that if the last term of each group is multiplied by a number larger by one, and the product divided by two (2), then we derive the same answer by the four direct additions. Thus 2x3-2=3; 3x4+2=6; 4x5+2=10, and so on. The third step consists in general izing this relationship in a literal form, as follows: $s=\frac{n}{2}(n+1)$. After taesting this formala in several specific cases we may be come morally convinced that it is generally true, but it is not yet proven true for the infinity of all possible values of n. The next step is the crucial one. We assume that the formula is true in the case of n terms, as follows:

1*2*3*4*5*-----*n = $\frac{n}{2}(n+1)$, (1) Tehn we proceed to determine whether it follows that if true in this case; it then must be true for n#1 terms. We do this by adding n#1, to both sides of the above equation, as follows:

 $1+2+3+4+5+----+n+(n+1)=\frac{n}{2}(n+1)+(n+1)$ (2) Transforming the right-hand side of the equation by simple algebraic process we get the equivalent in the following form:

1+2+3+4+5+----+n+(n+1) $\mathcal{F}_{2}^{n+1}(n+1)+1$. (3)

Clearly, the right-hand side of equation (3) has the same form in terms of (n+1) that equation (1) has in terms of n. Therefore, it follows that if the relationship is true for a series of n terms it is equally true for a series consisting of n+1 terms. But we have already shown directly that the formula is true when n has the value of 2, 3, and 4. Thus we know that it is true for 4+1 or 5, and knowing that it is true for β n equals 5, we know that it is true for n equals 5+1 or 6, and so on to infinity.

Is the foregoing logical process valid? If it was meant that the process was literally performed by an organism, it would manifestly be an impossibility to carry the successive steps to infinity. The judgment that the formula is valid for n equal to any value up to infinity, as a psychological or bio-psychological fact, is manifestly a finite existence. But the meaningful value of the judgment must be distinguished from its character as a psychological existence, and it is in the meaningful or logical sense of the judgment authorizes an infinite application of the formula. The question as to whether the above logical process is valid thus reduces to the question of the relationship between the existential and meaningful values of a judgment. If one were to assert that the meaningful value could extend no further than the existential conditioning of the judgment, then all mathematics, all science, and all religious doctrine and all philosophy would be invalidated. But this assertion would itself be the meaningful aspect of a theory, and would thus be selfdestroying. We shall not attempt here any full discussion of this subject as it is very large and profound, but the position assumed

is that meaningful value of judgment does have an authentication independent, in at least significant degree, of the psychological conditioning of the existential aspect of the judgment, and thus imply that mathematical and scientific reasioning along with philosophy and religious doctrine is valid in principle. This is not to say that error in the meaningful sense is excluded as a possibility, but rather that such error is to be judged primarily, at least, on the meaningful level, or dimension.

Several materialists, biologists and psychologists have, in point of fact, sought to discredit the meaningful content of religious experience on realization by destructive reasoning from the bio-psychological limitations of a formed conscious process and applying the adverse judgment to the meaningful content of the the processes. Generally this destructive thinking only to the religious field, but it should be clear from the considerations brought out in the foregoing paragraph that the same logic would apply with equal force to all mathematics, philosophy and science including the scientific theory on which the adverse judgment is based. Thus if this criticism were carried out consistently and implemented, it would destroy all possibility of knowledge and culture. The question is, therefore, exceedly fundamental and important.

We are dealing with questions here of such a nature that proof of the position taken is impossible, since the very basis of proof itself is involved. The standpoint one may take must be justified by faith, insight, realization or some other higher power. And this applies in both the cases of experience-grounded judgments and logic-grounded judgments. The position taken here is that a meaningful value meaning the infinite in either a

mathematical or religious sense is, in principle, possible and valid.

The question of the relationship between the existential and meaningful aspects of the judgment is important and must, ultimately, be given due consideration. One thought will be here suggested as to this relationship. If we assume an interconnection of all entities, then that principle must apply to the existential and the meaningful. But such a relationship can be envisaged such that due freedom is retained for the development of the existential and the meaningful. Thid we suggest by the notion of multiple dimensionality. Two components, x and y, of a compound entity z=xy, may be conceived as independent each in its own dimension, and yet mutually determing z. In this case, z would be something other than the existential or the meaningful.
September 21, 1952

Third lecture by Franklin Merrell-Wolff of the Holistic series dealing with a method of the supermental descent.

Last Sunday we covered preliminary ground in which we became, presumptively, more familiar with the meaning of the word "finite", and we, perhaps, all had some experience of an enlargement of our previously existent ideas as to how big finite can be. As a matter of fact we did not deal with any conceptions that were really difficult at all. The difficulty was in the domain of trying to expand the perceptual imagination, to grasp notions which conceptually are rather simple. One lesson that should have come out of that experience is this, that the perceptual power is very definitely restricted. In what we shall do tonight we shall have to drop the perceptual power and operate with other cognitive powers. I shall outline three cognitive facets or powers.

First of all, "perception", which we shall understand as the cognitive aspect of sensuous experience. The impressions we get from the world become organized, more or less automatically, into what we call percepts, which are characterized by these qualities, that they are concrete and particular, and they are also definitely finite in their limitations. Last Sunday we sought to expand perceptual imagination so as to grasp something of the meaning of the googolplex, or 10¹⁰, a pretty big number. The second cognitive power we shall call

"conception". It is a cognitive power which is non-sensuous in its purity, however much it is true that in common usage it may be more or less confusedly blended with perception. In its purity and in its most efficient operation it achieves a high degree of freedom from the restrictions of the perceptual consciousness. It is characterized by generality, impersonality, and definitiveness. While these features are present in variable degrees as among different concepts, yet in their highest development we get an extreme generality and an extreme definitiveness and it is on that level that mathematics exists. The third form of cognition is one that is practically without recognition in the vast bulk of western philosophy and psychology, but not totally without recognition. There are at least references among the German idealists that point to it. By "introception" I mean a cognitive power which transcends the subject-object relationship, but like "perception", its content, if we may use that term, is concrete, while like unto conception, its content is completely universal, and not particular. Its key word is Light. You might call it cognition as pure Light. In its purity it operates only in the domain of the Infinite. It can be Realized, and when Realized in its purity, the sensuous or perceptual world drops away or vanishes, and likewise the conceptual world drops away and vanishes. There are possibilities of

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an interblending between these three cognitive components. In our work last Sunday we dealt with an interblending between perception and conception; in other words, we dealt with a domain that is familiar, more or less, to everyone. Tonight, as far as may be, we shall attempt to drop the perceptual component and its concrete particularity to journey on into the domains in which we propose to enter, and we'll see if we cannot in some measure effect a fusion of the introceptual with the conceptual.

I may say this about the vast majority of mathematicians; they operate on the level of the conceptual, freed from the perceptual, but without the Light of the introceptual. When you have the fusion of the introceptual and the conceptual, you have a different domain from that which is familiar to most mathematicians. You have spontaneous luminousness combined with the principle of organization. Now, we have before us a far more difficult task than that of trying to comprehend the googolplex. Let us consider the totality of all natural numbers; these consist of the positive integers, the one, two, three, four, and so on beyond all limits. One number and only one in that series is the googol, and another one is the googolplex. Consider this whole series as one entity, that means consider all possible integers whatsoever, -- and remember there is no such thing as a last integer--and embrace that totality as one entity. Now, you cannot embrace it in the sense of

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putting a circle around it. You could, in principle, put a circle around the googolplex. The embracing has to be done in another way. Let us say, symbolize it by the arms held out this way with an open space between the hands and not making a closed circle; the arms thus defining a zone in one sense, the open space indicating a limitlessness. But the task placed before the conceptual imagination now is to grasp that totality as just one entity. We'll have to go further than that. We are indebted to two German mathematicians of the last century for the definite defining and characterization of the Infinite. These two are Dedekind and George Cantor. It is noteworthy in the work of Dedekind, in his essay on "The Nature and Meaning of Number", that you hardly ever see in that essay our ordinary numbers at all. It is an essay about sets and classes, about the primary ideas in the mind, and theorem after theorem developing from that simple material, derives the most fundamental properties of number. Some of these we spoke of last Sunday.

Number grows out of the establishing of a one-to-one correlation between two classes. Last Sunday we took this process back to the stage of the infant and the primitive; we saw how correlation probably first was made with the fingers of the hand and various objects, later with pebbles and various classes of objects like sheep, and so on. That was before notions of number as we have them were born.

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That is fundamental counting. That is fundamental number. The basic notion upon which we build is that we can call two classes similar, or, in ordinary language, equal, when we can set up a one-to-one correlation between the two classes so that there are none left over in either class. Thus, if there were 5 coins and 5 pebbles we could set up, even if we didn't know the word five or the number five - that notion having not yet been born - we could draw a line between a pebble and a coin and a pebble and a coin, etc., and exhaust the two classes at the same moment. When that happens we say they have the same cardinality - the cardinal number being the quantity number rather than the order number. We had better get used to the word cardinality because we are dealing with notions that are very fundamental. And just as an intercalation at this point, I may next Sunday, or sometime later deal with some preliminary efforts along the line of what we might call a construction of a Holistic mathematic - just some preliminary ideas. To achieve any understanding of even the initial idea, you have to grasp the conceptions with which we are dealing tonight. The reasons for that will later appear. But now we are going to note the property that is peculiar of our class of numbers. I put down 1,2,3,4,5------(a dotted line afterwards which means it goes on forever) And I'm going to put another line below, which will be the doubling of each of the first numbers.

- 5 -

1 2 3 4 5 -----2 4 6 8 10 -----Now here is a very important point. We can set up a one-to-one correlation between these two classes or sets thus:

l	2	3	4	5n
1	1	Ť	\$	
Ž	4	Ğ	8	102n

That's counting. If there are just as many in one set as there are in the other, they have the same cardinality. Now is it not evident to you, that no matter how far we go in the first set we will always have a number in the second set corresponding to each number in the first set, and, corresponding to any number "n" in the first set there will be a "2n" in the second set. There will <u>always</u> be a 2n corresponding to the n; therefore there are just as many numbers, just as many elements, in the second set as there are in the first set. But there is another important fact every element in the second set is to be found in the first set. Two is found over here, four over here, six over there, and so on, in the first set. Yet there are elements in the first set that are not found in the second. One is not found in the second set, three is not, in fact, every odd number is not found in the second set. There are just as many in one set as the other; the totality of elements in the second set is the same as the totality of elements in the first set. They have the same cardinality. The second

set is a sub-set of this, because all of it is found in that, but not all of the first set is found in the second set. Now that quality, that property, is the definition of an infinite class. An infinite class is a class which has one or more parts--proper parts--which have the same cardinality, that's the same number--totality, as the whole. That is never true of any finite collection, or finite class. You take a proper part of a googol, for instance, you take a sub-set of 100, out of that googol and the googol will be reduced by that 100 in its cardinality. You can't set up a one-to-one correlation. It does not have a proper part, which has as many elements in it as the whole. Only infinite classes or sets have this property.

Now, there are some very wonderful things you can do with our integers. Would you believe that you could count with the integers all the rational fractions? Just consider the rational fractions between zero and one. It is obvious, isn't it, at once that there is an infinity of them in that domain? One over a goolgolplex would be one of the fractions in there, one-half, one-third, all the fractions with one in the numerator and any number in the denominator, and several with a larger number than one in the numerator, and that between one and two you find a similar infinity, and so on between all contiguous integers whatsoever of the whole series. You would have an infinity of fractions between every one. Is that clear?

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Now what we propose to do is to count the sum-total of all fractions in the whole number system which extends out to infinity. What do we have to do to do that? We have to order the elements in a definitive way, such that, we will be sure of counting every fraction whatsoever. Think about it. How would you go about that? How would you start a system that would enable you to know certainly that in that system you had all of your numbers--rational numbers, fractions and integers -- so ordered that you had them all, and knew that you had them all. Now you couldn't start from zero and then take the next fraction. It wouldn't be one-half, it wouldn't be one over a googol, it wouldn't be one over a goolgolplex. There is an infinity of fractions between a goolgolplex and zero. Now we want to try to order the rational numbers so that we can start counting. You cannot count until you can order. It so happens that this is worked out in a very clever and rather simple way. Let us write the numbers in this fashion:

1		7			· · · · · · · · · · · · · · · · · · ·
	1 1	<u>1</u> 2	<u>1</u> 3	<u>1</u> 4	$\frac{1}{5}$ to infinity
	$\frac{2}{1}$	22	<u>k</u> <u>2</u> 3	<u>2</u> 4	<u>2</u> •••••
	34	2 ,2	<u>1</u> 3	3 4	<u>3</u> 5
	<u>4</u> 1	<u>4</u> 2	<u>4</u> 3	<u>4</u> 4	<u>4</u> 5
	5 1	<u>5</u> 2	<u>5</u> 3	<u>5</u> 4	<u>5</u> ••••••
	•	٠	٠	*	©
	•	•	•	•	
	•	•	•	•	Table 1.
	-				

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We take every rational number, integer, or fraction, and write them in the form of a numerator over a denominator and arrange these elements in an infinite set of series, in the form given in Table 1. Here there is an infinite number of series, each one consisting of elements written in the fractional form, as stated, and on the first horizontal line the numerators are all unity, while the denominators start with unity and increase by the progressive addition of unity, so as to form the normal sequence of the positive integers, and without limit; while on the second horizontal line the numerators are all the integer 2, the denominators having the same arrangement as in the first horizontal line; and so on in succeeding horizontal lines, beyond all limits. It is at once evident that this arrangement will include all positive rational fractions and all positive integers, but so arranged that the next following element after any given element is explicitly This gives us a well-ordered arrangement so determinant. that it is possible to set up a one-to-one reciprocal correlation between all the elements in the Table and the positive integers, in other words, it is now possible to count the totality of all positive rational numbers. A good way of doing this is to start with the first element in the first horizontal series and correlate it with number 1, the second element with number 2, the first element in the second horizontal series with number 3, the third element

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in the first horizontal series with number 4, the second element of the second horizontal series with number 5, and so on, as indicated by the arrows in the Table. This process we can carry out more expeditiously by writing the fractions as a pair of numbers, e.g, $\frac{m}{n}$ as (m,n), and arranging the whole Table as one horizontal series in such a way that the sums of the two numbers (m plus n) increase progressively, and when there are two or more equal sums, the elements are arranged in the order of increasing numerators, thus: (1,1), (1,2), (2,1), (1,3), (2,2), (3,1), (1,4), (2,3), (3,2), (4,1)-- $\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$ $\frac{1}{5}$ $\frac{1}{6}$ $\frac{1}{7}$ $\frac{1}{8}$ $\frac{1}{9}$ $\frac{1}{10}$ --

Table II.

It is clear that the arrangement in Table II can be derived in a perfectly determinate and exhaustive way from Table I, and that a one-to-one correlation can readily be established between the ordered elements and the positive integers in their normal sequence. It is also clear that any positive rational number (integer or fraction) will appear as some element in the series of Table II, say, the nth, and, then, corresponding to this, there will always be the integer n. Hence, every element will have been counted by means of the integers alone. This means that the totality of all positive rational numbers--integers and fractions-has the same cardinality as that of the positive integers alone. The process employed is simply a continuation of the same rules employed in ordinary counting of finite classes. This is mathematics of the infinite now; not the mathematics of finite manifolds or classes. It is a different domain developed by a mental process. But it just so happens that this correlates with, and gives a rational pattern to, many reports from mystical experience--experiences that appear to the ordinary consciousness as quite irrational as they are ordinarily formulated. When you use this kind of logic, This is they fall into a comprehensible and rational form. what makes this discussion of the infinite important. In fact you do not have to say: "thinking has to stop when one gets over into at least some dimensions of the Transcendent". We are dealing with an instrument that enables us to carry a kind of thinking over into the Beyonds. What we are using here in our one-to-one correlation is precisely what primitive man did when he counted with his fingers. And if you are justified in saying that if you get a correspondence with these five fingers and certain objects, then they have the same cardinality, then, also, you are justified in saying the totality of all rational numbers has the same cardinality as that of all integers.

You've got to forget all the rules that held in your ordinary grammar-school arithmetic. This is another domain. Now this infinite, an infinite like this that can be counted, is called a denumerable infinite. The idea is that if you could count for an infinite time you could count them all. Later we will have to consider the infinites that cannot be

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counted.

I will merely note the fact that a further proof was made that demonstrated that, not only the whole of the rational numbers, but also the whole of the algebraic numbers can be counted. Algebraic numbers include all rational numbers, plus a large number of irrationals like the square root of two and imaginaries like the square root of minus one, or complex numbers like $a + b \sqrt{-1}$. They are numbers, the technical definition of which, you probably would not understand and, would not be expected to understand. But they are the numbers that can be the solution of algebraic equations of any degree having integral coefficients. The class of numbers is so large that we ordinarily represent them by a plane or two-dimensional space. This is done by the method illustrated in figure I:

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Two lines are drawn at right-angles to each other, one horizontal, the other vertical, as in the rectilinear co-ordinate system. An arbitrary distance along each line is given the value of unity and the integers associated with multiples of this unit, positive integers to the right, and negative integers to the left, on the horizontal line. Fractions, such as $\frac{1}{2}$, and the ordinary irrationals, such as $\sqrt{2}$, are associated with their appropriate points between the integers. The imaginary numbers--involving multiples of $\sqrt{-1}$ --are similarly associated with points on the vertical line, with fractional and irrational multipliers appearing in their appropriate positions. The numbers appearing on the horizontal line are known as "real" numbers, on the vertical line as "imaginary" numbers. Numbers which are formed as an algebraic sum of a real and an imaginary number are called "complex" numbers by points of the plane, as indicated in figure I.

Numbers of the foregoing type can, in general, be solutions of algebraic equations. It is clear that we have now added several infinite classes to the class of the positive rational numbers, i.e., the negative rational number, the ordinary irrationals, the imaginaries, and the complex numbers. Yet Cantor proved, by a method which we shall not review here, that the sum-total of all these numbers, which can be solutions of algebraic equations, can be ordered in such a way that a one-to-one correlation can be

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set up between them and the sum-total of positive integers. Hence the totality of all these numbers is denumerable.

But we come now to the next step: A proof,--although there is at this point some difference of opinion--that one cannot count the total of all real numbers. Real numbers consist of those that are not imaginary like our integers, like our fraction a/b and all of the simple irrationals, such as $\sqrt[3]{7}$, and so on. But the real numbers include numbers like 77, the ratio of the diameter to the circumference of a circle, and e, which may be written $L(1+\frac{1}{n})^n$ $n = \infty$ These two numbers of enormous importance.

 $m{\pi}$ you can appreciate. e is the base of our natural system of logarithms, but, more important that that in one respect, it is found wherever you study the phenomena of life. Get the statistical data connected with anything that is living, draw your curves that correspond to your statistical data giving your life cycle, then this curve, when reduced to a formula or to an expression, always involves the number e. There is some mystery in that. But e may be called the number of life. Now e and π are transcendental numbers. That means technically that they cannot be solutions of algebraic equations having integral coefficients. At the time of Cantor these were the only transcendentals definitely known. But his proof was that transcendentals are so much more numerous when contrasted with algebraic numbers, that they cannot be counted.

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Now here is a small example of proof that employs the reasoning that is sometimes used in higher mathematics. We are presented with the problem of ordering all the real That does not mean merely the rational numbers, numbers. integers, and fractions, which it is easy to order, but now we are going to try to order <u>all</u> the real numbers. That means we would have to include every irrational and every transcendental there is. It is an impossible order. There is no way of doing it - at least no way that a human mind can envisage. Cantor suspected that the number of real numbers was so great that one could not count them, even with an infinity of integers. Now let us consider the region from zero to one. If we could prove that one could not count all of the real numbers between zero and one, then obviously it would be impossible to count all the real numbers from zero to infinity. So all we have to consider, if we are going to prove that they cannot be counted, is the region from zero to one. Let us take every number and write it as non-terminating decimal. Thus, while some are naturally non-terminating, most of them would be, and if we had a decimal, such as .4 which is complete, then we write it in the non-terminating form .399999-----9. So you can write every one of these terminating decimals or fractions in a non-terminating form.

We are going to write all the numbers between zero and one in a non-terminating form; but since we cannot

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find an order, so we simply assume that an order exists. Then we compose a Table in which we represent the infinity of non-terminating decimals by employing letters with subscripts to stand for the digits in each decimal, as is given in Table III.

 $1 \leftrightarrow 0.a_1 a_2 a_3 a_4 a_5 \dots a_3 a_5 \dots a_3$ $3 \leftrightarrow 0.c_1 c_2 c_3 c_4 c_5 \ldots$ $4 \leftarrow 0.d_1d_2d_3d_4d_5\cdots$

Table III

We set up this Table as indicated and establish a one-to-one correlation between the positive integers and the series of non-terminating decimals. If our Table embraces all of the real numbers between zero and unity then we would have proven that they are denumerable. But examination reveals that no matter how completely we develop the set there always remains an infinity of numbers which have not been included. This is evident from the following consideration: If we write a non-terminating decimal which differs from the first decimal by having a different digit or one other than a_1 , in the first place, and other than b_2 in the second place, and other than c, in the third place, and so on, then this number will differ from every number

in the Table in at least one place. This process can be repeated by diagonals beginning with a_2, a_3, a_4 and so on, so that obviously there would be an infinity of numbers not included in the Table, however complete we attempt to make it. In other words, our assumption that we could order the numbers and count them has proven false. The other conclusion is that they are not denumerable, that they are so numerous that the infinity of digits that could count all of our fractions, all our algebraic numbers, still could not count the sum-total of all real numbers. Here is where the logic becomes subtle.

The logical principle that is employed here is this; first we say that the totality of all real numbers is countable or it is not countable. If we find that when we assume that it is countable we run into a contradiction, then the conclusion must be that it is non-countable. That's the The question as to whether this reasoning is dichotomy. sound or not depends upon whether the dichotomy is valid. Thus, for instance, if we were to say that an equation is either reducible or not reducible, we would have two possibilities. It belongs one class or the other. Is this principle valid? Is there some middle ground which belongs to the zone of that which is not reducible and not nonreducible? Some criticism of the reasoning here has been brought from that angle, but if we accept the soundness of the reductio ad absurdum then it follows that the sum-total

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of all real numbers is more than a denumerable infinite. Now here is the interesting fact. In Cantor's time two transfinite numbers were known. Since then several classes of an infinite number of transfinite numbers have been discovered. They are infinitely more numerous than all the other numbers put together, and yet they are hard to discover, and only two of them are well-known to everybody, namely 7 and e.

Let us suppose we took all numbers other than the transcendental, all the algebraic numbers, integers, rational fractions, the ordinary irrationals, the imaginaries and complex numbers, and we placed them out in space as I showed before in Figure I. Then we find this true, that between any two of those numbers that would correspond to specific points we can always find another number. Do you see that from that statement it follows that we can always find an infinity of other numbers? Here is a check of our logical sense. If between A and B, or 1 and 2, we can find another number, if all this is true that between any two numbers we can find another number, then it must follow that between those two numbers we can find an infinity of other numbers. Of course, quite obviously, there exists between our a and our b another number, which we call c, but our rule says that between b and c we can find another number, and so on ad infinitum. That is another

feature of mathematical thinking that is very fundamental. It's part of the step from any-ness to every-ness.

If we can say something about any member of a class, or set, or group, or collection; (by "any" we mean one picked at random), then whatever we can say of <u>any</u>' we can say of 'every'. You see we are picking out 'any' on the basis of its general property, and are not concerned about particularities that may attach to special entities. Now it would seem, would it not, to you, that after we got down all of the algebraic numbers, all of these numbers we have been talking about except the transcendentals, that that plane would be pretty solidly filled? Remember that we can always get an infinity of numbers between any two points. Yet as a matter of fact that plane would be like a sky with the numbers corresponding to points like stars with vast blank spaces in between. Our plane is not densely filled. Remember our points have no area at They're absolutely sharp, area-less. They have not all. packed that plane, but actually that plane has infinitely greater spaces in it than the space that would correspond to the numbers. In other words, without the transcendentals we do not have a true continuum.

The only way we can fill that space is by bringing all of the transcendentals into it. I think you can begin to see the enormous vastness that belongs to the transcendental numbers as compared to all of the other numbers.

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So, one simple notion of infinity is not enough to take care of our total problem of determining the cardinality of all possible classes. This leads us to what you might call a hierarchy of infinities.

The first infinity which corresponds to the total of all integers, which was sufficient to count integers and fractions, and in addition sufficient to count all algebraic numbers, has been written variously as \mathcal{H}_{a} (aleph null), or aleph sub-zero, and sometimes as ω (omega) sub-zero. (\mathcal{H} is the first letter of the Hebrew alphabet and $\boldsymbol{\omega}$ is the last letter of the Greek.) And this is known as the denumerable infinite, corresponding to the cardinality of all integers. The cardinality of all real numbers is more than infinitely greater than that. We have a very interesting multiplication table or certain laws that attach to these numbers. We take $\mathcal{H}_{o},$ add 1 to it, and the answer is just $\mathcal{H}_{o}.$ We add a goolgolplex (1010100) to it, and it swallows that just as easily. The answer is still \mathcal{H}_{o} . Or again, if we subtract a goolgolplex from it, we have $\mathcal{H}_{o} - 10^{100}$, and that just equals \mathcal{H}_{o} . You cannot disturb the calm of \mathcal{H}_{o} in that way. You see, a whole universe like this we live in could drop out and \mathcal{H}_{n} would go on just as placidly as you please. Nothing happened. Or, now let us try something else, and see what multiplying will do. We will multiply $\mathcal{H}_{\mathcal{A}}$ by a goolgolplex, (10^{10¹⁰⁰}) still $\mathcal{H}_{o} \times 10^{10^{100}} = \mathcal{H}_{o}$. \mathcal{H}_{o} has

not changed it at all. The multiplication table is very easily learned when it's like that!

We can go still further and multiply \mathcal{H}_{o} by itself; that is equal to \mathcal{H}_{o}^{2} . It just equals \mathcal{H}_{o} . We haven't disturbed it yet. It takes something more powerful to disturb it than that. This means that none of these processes have taken us out of the domain of the denumerable infinite. This is what we have to do to produce any effect on \mathcal{H}_{o} - we raise \mathcal{H}_{o} to the \mathcal{H}_{o} power ($\mathcal{H}_{o} \stackrel{\mathcal{H}_{o}}{}$) and at last that does something. We get \mathcal{H}_{1} , the second transfinite number. Now, you may ask, does this correspond to anything? It corresponds to the cardinality of the totality of all real numbers including the transcendentals, and the cardinality of the continuum, that is, the mass of numbers it would take to make all of this space solid.

The same effect of multiplication and addition applies to \mathcal{A}_1 . As a matter of fact, \mathcal{A}_1 raised to the \mathcal{A}_0 power remains unchanged. The only operation that affects \mathcal{H}_1 is raising it to the \mathcal{H}_1 power, in which case it achieves a higher cardinality and becomes \mathcal{H}_2 . Now, there is some evidence that \mathcal{H}_2 corresponds to a class of entities with which we actually deal. The statement is that it corresponds to the number of single valued functions, but you will not understand that.

Let us assume the process carried to the limit, and we get \mathcal{X}_{∞} - the symbol of the whole, The Holistic. This

is the most comprehensive conception evolved in the mind And since the mind of man is a part of the Whole of man. it could not evolve something greater than the Whole, hence the most adequate symbol of the vastitude of the whole is Ж. Our goolgolplex by now is a microscopic pellet. In the sea of the Illimitable, the whole galactic universe, nay, a denumerable infinity of galactic universes of the same size, would dissolve into sub-microscopic insignificance. It really makes no difference whether you call the universe an Illusion, as Shankara did, and as the Buddhists do, or whether you call it Real, as Sri Aurobindo does. In any case, in the presence of the multiple infinitude of the Whole, it is absorbed as an insignificant irrelevancy. Hence, whether it is real or an illusion is not a point of vital importance.

When a mathematician speaks of the infinite, he does not mean merely a big number. He means things like this series of which we have spoken. But he means in differentiating between infinities of different orders that they still have a character, that it is not a blank of largeness in which there is no element of determinateness at all, but rather that they have a character so that there is something distinguishable - a hierarchy of infinities. Now the question would arise, how could a finite creative ever know, ever realize, the Infinite. And the answer is,

a finite creature never could, for the finite creature would be limited to a progression of finite steps, and in a finite time could never realize the Infinite. But if the reality of man, nay the reality of all creatures, of all entities, is that they are part and parcel of the Infinite, not merely cut off apparent finite fractions, but co-extensive with the Infinite, then the Infinite is knowable in the sense of Realization by the simple removal of an obscuration. I considered it very significant when Dedekind gave his existence-theorem concerning the reality or existence of infinite manifolds, he said, take the ideas in the human mind \mathcal{A} One can have an idea which we call a, and then we can have an idea of that idea, which we'll call a_2 , and then the a_2 can be put in the first series as an object of thought and our a, would be the idea of this idea, and that can be placed up in the first series and the process be continued in that manner. Every idea in the second series would be in the first, but there would be one idea in the first series that is not in the second. Particularly he gives the idea of our own ego as one not included in the second. Both series have the same cardinality because of the 1-to-1 relationship; therefore, the ideas in the human mind are infinite. Now that does not mean that they are infinite in the sense of actual concrete thinking of an infinity of ideas. You might say it is

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infinite by this power of a generating progression. But the very power to generate the progression and to see it points to its infinitude. I know these ideas have some subtleties in them. They are not too easily grasped. I am quite sure that the lecture of last Sunday probably seems rather simple now, and the googolplex is something you may take in your stride relative to this.

I have been thinking during the last few days of a possibility of formulating the first principle of what we might call a Holistic mathematic, and I might by next Sunday be prepared to give a first talk on this, but I will have to assume that you are familiar with the kind of thinking we've been doing tonight. It will prove necessary if we are going to use the basic Holistic conception, to use the mathematics of the trans-finite. This that we have done tonight is preparatory, in one sense, to this new conception. Our other purpose was to secure some more adequate understanding of what is meant when we speak of the Whole. This is no simple denumerable infinite, but a vast non-denumerable Infinity, compounded an infinity of times. Naturally, we sink as relative beings into a less than microscopic significance compared to That, but he who knows that this vastness which is none other than Parabrahm, is That with which in Truth he is identical, need not identify himself with an insignificant finite appearance,

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but may know, as Shankara said, that he is not only a part of Parabrahm, but that he is identical with the Whole of Parabrahm.

Now let us add to that, Sri Aurobindo's insistence upon individuality. By the use of the conceptions we employed tonight it is quite readily possible to reconcile those two statements of Identity with Parabrahm, or the Whole of the Holistic, and yet retain infinite variety of infinite individuality. That, I think, is enough for tonight. September 28, 1952

Fourth extemporaneous lecture by Franklin Merrell Wolff.

This lecture tonight will be the fourth and last of this particular series. At the close we shall develop a formula of exceptional abstraction and generality, which, perhaps, we may call "the formula of the Holistic." But to begin with it seems well to prepare the ground and to show how a problem has arisen, which forces an effort other than that which has been known heretofore. It was in the early part of the 17th Century that a certain tendency or movement in the thought of the West came to a final culmination in a statement of Descartes. This statement was: there are two orders of being, one an extended and highly determinate order known as "material substance". and, in contrast to it, another order which was obviously not extended in space and in time which he called "mental substance" or the order of consciousness. Now it is obvious that the properties attaching to what we ordinarly. call consciousness are in many respects quite different from the properties which we seem to find in the material side of nature. One immediate effect of this radical dichotomy was an enormous development in the field of science; a development which lasted for something like 250 years before it began to face certain serious diffi-But this separation of consciousness or the culties. order of consciousness from the material substances that were extended posed a problem of more than ordinary difficulty for philosophy. The problem was this: what

relationship exists between the order of consciousness and the material entitles of the physical universe. It appeared that we could build up a system that was determinate in high degree. At one time it was thought it could be made determinate in a complete sense with respect to the material entities. This order was very responsive to mathematical formulation and calculations. We could achieve a high degree of prediction that was reliable. But the same thing did not appear to be the case with respect to the order consciousness. Here there was something like a direct or immediate feeling of freedom and indeterminateness. How do these two orders get together? What possible relationship is there between them? Four answers have been offered in the course of thought. One is: the only real order, the only selfexistent order and determinate order is the material order, and consciousness moves upon its back as a sort of irrelevant epi-phenomenon. That is none other than pure Materialism. Opposed to this, and profounder in its understanding, was the Idealistic interpretation which viewed the material order as being essentially of the nature of ideas, hence existences in consciousness and of the nature of consciousness. Both lines of course led to some difficulties; difficulties that haven't been resolved to this day. There were two other possible courses, one was the inter-

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pretation through parallelism, the system developed by Liebnitz. There was a conscious order it was conceived and a material order and these two were related to each other by a pre-established harmony, a harmony established There was not a causal connection between the by God. conscious order and the material order, each operated according to its own laws, but the harmony between them. existed because their lines of development were parallel rather than inter-connected. The fourth line of suggested correlation was that of inter-actionism, the idea being that the conscious, or mental, could act upon the material and produce effects while the material could act upon the mental and also produce effects. Of course, the difficulties facing this theory, in at least the earlier stages, were these, the material order seemed to be determinate externally, there seemed to be no place, no room for the intervention of any free act of consciousness that could affect the material system. This was the immediate difficulty which was produced as a result of this strong dichotomy.

Humanity as a whole was not too much troubled about these difficulties because there was a radical release in the field of practical science. However, particularly in our own day, difficulty has arisen in the field of science. Certain facts have become evident as a result of greater and greater subtlety in physical observation until finally

it has resulted that in the field of the very large and extremely small the integrating conceptions of Sir Isaac Newton no longer work effectively. This problem ultimately led to the new integration which we know today as the theory of relativity, with which the name of Albert Einstein is associated. With the Newtonian conception we have the radical separation of entities. Thus Newton regarded space as an entity by itself and time as an entity which flowed freely through space, whether there was any object in space or not, and matter as a third fact. These three facts were then combined in the analytic treatment and to a certain point very effectively. And as a matter of fact it appears to us that this treatment, as far as it goes, has the beauty of great simplicity; it is easy to understand. As I said, difficulties arose when we came to the finer order of observations. Facts that were developed would not fit. The Einstein theory took care of these facts and of all of the facts which the Newtonian theory handled, but it employed among other things the conception of a hyphenated space, time and matter, not three distinct and independent entities meeting in a group of external relations, but a hyphenated three-fold or triune entity. There is not a space apart from matter nor apart from time, there is not a time apart from space and matter and so on. Here we see the beginning of a new type of conception which we may call the hyphenated conception. It replaces the notion of an A and a B, or an A

or a B, by an A-E (hyphenated), the conception being that the two or more entities do not have independent existence, but have an interdependent sort of existence. Now the problem that first appears to one when he faces a conception of this type, if he has been brought up in the classical mechanics and dynamics is the thought that the conception is not capable of being handled, that it throws overboard precision and calculation. But it is to the credit of Einstein that he did show that these conceptions could be handled with precision and dependability, not only on a pure theoretical level, but in the form of a very notable practical demonstration in the calculations that made possible the atom-bomb.

Another problem also arose, though it did not receive recognition as early as the phy sical problem, but in its way it was much more serious from the human side. This problem consists in this, that the dichotomy or radical separation into a dualistic pattern has upon the human consciousness an effect which tends toward neurosis and psychosis, both in the individual and collective sense. I am not going to trace this at all, but just wish to mention it and note the fact. This has rendered necessary a development which belongs to our own time and is very modern, indeed. This development consists of the application of the hyphenated conception to the field of life and psychology, or the domain of man's consciousness, the bio-psychological. We have emerging what is known as Gestalt psychology, or the

Psychosomatic psychology, physiology, and anatomy, which is now replacing the old patterns of the dichotomy between the physical and the psychical or mental unconscious, with an interlocking conceptuality or an interlocking pattern in which conceptuality and other formations than conceptuality enter into a complex whole. The first thing that strikes one as he views this is that now we are coming into a domain of extreme difficulty. He asks himself how can one think here without throwing overboard every element of precision, of the necessary determinateness for practical and theoretical orientation. Are we going to enter into a sea of such indeterminateness that one finds himself in a veritable That is a possibility. We have at least a certain chaos? definiteness in the older types of conception. But we are forced in this direction because there has been an outcome which is destructive and even catastrophic. Insanity is increasing even though other forms of sickness are decreasing or apparently so. And not only is this true on the individual level but we also find it on the collective level, for after all a manifestation like that of the Nazis, of the Fascists and of the Communists is essentially something that belongs to abnormal psychology. The danger is grave. Disaster could come that would be sufficient to destroy this culture and carry us back to a primitive way of life, at least as far as those who still remained alive were concerned. On the other hand, there is, and there always is, a higher

possibility in any of these critical periods.

One phase of this effort falls in the field of the building of concepts to meet this new demand, concepts that can serve as anchoring or stabilizing principles. Even though these concepts may not prove to be eternally stable they may more or less serve their office by being relatively stable, affording some basis of stability, and some basis or orientation is necessary, even though after having made a transition the individual may be capable of abandoning the old orientation and establish himself in the new. And the same point applies to the race. Still, in the transition, the finding of the most durable and stable element is a matter of the greatest importance.

These two corrective tendencies are not the only ones we may note. When the Theosophical movement was founded in 1875. the virtual key note of it was this; a synthesis or integration of religion, philosophy and science, and also, in another respect, an integration with respect to Buddhism and the The keynote effort here was a drawing together of Vedanta. those things that tended to diverge. This again was the fundamental keynote of Sri Aurobindo in his work; in which he introduces explicitly an integral philosophy and an integral Again, in the field of Cybernetics, the domain that Yoga. renders possible highly developed work with respect to our modern instruments of communication and control. The work is done by teams who integrate knowledge from widely diverse fields, the teams being organized on this basis: the individuals of high professional specialization in a given field

render themselves competent in perhaps five or six other fields so that they can understand the specialists in those fields. These specialists with this cross-understanding, which they have acquired, meet and are able to work together in the construction of conceptions, of actual engineering and final fabrication, in a domain which no one mind could encompass. As one looks at these developments he gets this impression: it seems as though Mother-Nature has struck a note or a tone, or given forth an order into the human consciousness demanding a movement away from the radical separation or dichotomy which played a valuable part in its day, but an imperfect part, and from that moving towards an integration. We use the term "Holistic" as a new name for a movement in this integral sense that is especially radical in its primary formulation. And it is with respect to that that I wish to offer tonight a mathematical conception, just the beginning of what may sometime be the form of a new kind of mathematics. We will deal tonight only with the root conception which makes up the formula, differentiating what we may call the Holistic from the non-Holistic, in the form that is most universal, least particularized, or at least so it seems to us. To start with let us conceive of "entity" as any possible object of consciousness. "Entity" will be a The "entity" is substantive, by being any. fundamental term. possible object of consciousness. An entity can be a living being, it can mean what we ordinarily call an inanimate or material object, it can mean an idea, it can mean a principle,

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it can mean not only an idea but the concrete or abstract idea, anything that can be an objection of consciousness. It is perfectly general. We shall have to consider a complimentary notion which we may call "relation". Any principle of operation or relating will be considered as a binder or operator between entities. The notion of operators or relators is already familiar to you in the field of ordinary mathematics. The plus sign and minus sign, the sign of division, of multiplication, or raising to powers, of extracting roots and of differentiation and of integration, all of these indicate operators, and in general. The letters a b c and x y z represent entities. Entities and operations are the two fundamental things. Now the operation corresponds, in the fields of psychology and biology, more or less to notion of function, and the entities might correspond to the notion of structure. But we also can make these operators objects for our consideration so that we can extend the notion of "entity" to a consideration of a very abstract idea. One might consider the question of what happens when operations of various sorts stand in various relations to each other. So we have the notion of entity overlapping the notion of relation or operators. I shall represent entities in the first place by Greek letters, that is a, (3, and so forth, and we might have a /2 and a /2 and a . You are not too familiar with these letters and so I use them to achieve a greater degree of abstraction even than that possible with familiar symbols. I am not going

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to use words in the representation, because the words will arouse a meaning that is already established in our minds and that would give us a certain bent in some direction. We are going to get back to the feature that is the one essential characteristic of the new way of thinking, and isolate that essential characteristic from any concreteness as far as that is possible, and still have some representation. I am going to introduce now our symbol that I invented, though it may not be the best one for this pur-It is a dash with a crescent to the right of it pose. -(. I have not even got a name for it yet. Well, I suggest & series of meanings which we will drop off later that will suggest something to your mind . We can think of it as meaning "exists in", or "subsists in", or "interfuses" or "is caused by", and perhaps other meanings that can carry similar significance. But now, let us forget that concreteness. We are not going to be that concrete. We have to reach a new depth of abstraction. I am going to put down this statement: (a --- (a)

expressing this abstract relationship, this Holistic relationship. Now the decisive property of this relationship is this: ?) in that relationship to (?) implies (?) in the same relationship to ?, thus 2 - (2 + 2) - (2 + 2)

where the symbol ().) means "implies". In this connection I wish to read you one little sentence from Aurobindo, as

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follows: "A mental description of supermental nature could only express itself either in phrases which are too abstract or in mental figures which might turn it into something quite different from its reality". Now we are going to try to avoid those mental figures that will turn it into something quite different from its reality and yet we want to try to say something. We have got to go the other way and be just as abstract as we can. In general, let us put down the collection of all possible entities. Let us take out one of them and call it ∂_j , and this relationship will hold with all the other entities, $(3, f, \partial)$, and so on to \bigcup . Thus $\forall \neg \langle \Theta, j \partial \cdots \cup \rangle$, the sum total of all possible entities of all sorts: living beings, inanimate beings, conceptions, ideas, perceptions, dreams, anything that can possibly be an object of consciousness. 9 bears this relationship (--- () to all of those and it applies vice versa (S bears that relationship to all of those, , and so forth. a & bears that same 3, 8, 9 relationship. That will be enough - you can carry that on through. Everyone of the entities, you could say, subsists in all the others, and the subsistance is mutual. That is a most general statement. We may have occasion ultimately to consider these entities in more specific relationships, but here is one thing I would have you note, i.e., the possibility that we can have groupings like (3, 4, 3), and other groupings like $\mathcal{O}, \mathcal{O}, \mathcal{T}$, and so on indefinitely.

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But these would be groupings that are more intimately united. The collection of entities and relationships that make up a human being is distinguishable from that which makes up a rock. Let $(\exists, (\exists, f))$ be, for instance, the groupings for a human being, (f, \rhd, Υ) the groupings for a rock, or any other complex entity. Thus we would have more intimate interconnection within a group than between one group and another. The point is that ultimately this relationship expressed by this symbol (--(f)) is interchangeable throughout. Nothing exists by itself out of relationship of interdependence with anything else.

Now it is relatively easy to see the validity of the principle in the correlation between consciousness and one's body. We have abundant evidence that material conditions do affect our consciousness. Thus, let us take a drug or drink alcohol in quantity and our consciousness is affected; materialisubstancey produced an effect. upon the conscious-Purely physical forces can produce an effect on conness. When one is freely falling he has a different sciousness. state of consciousness, and a happier one, incidentally, from all reports, than when he is bearing the load of gravity as he does when walking on the earth. Also, when he is being rotated rapidly, he has a different state of consciousness, generally not a happier one, that is different from that when he is not being so rotated. Consciousness can be affected by material forces, both chemical and physical.

Well, that is common knowledge, nobody has to be told that. The thing that has not been so well known but is becoming better known today, because we have subtle instruments that can now measure as we did not have a few years ago, is the fact that change of conscious state can produce somatic changes. Thus, suppose persons are gathered together having a philosophical discussion on a certain level, with the result that measurements show that there is a change in the neurol processes of the individual, or a change taking place in the bio-chemical processes. In this case operations in consciousness produced effects in the material. order. Well; this is on the level of scientific evidence that is as provable as anything observational can be proven. Dr. Rhine has shown some phenomenailthat are perhaps even more startling in the domain of telekonisis, where the action of thought and speech directed upon the dice used in a game of craps has produced effects that are different from those which pure chance would give. All this is reasonably understandable, but suppose we take an extreme contrast like that of an ingot of steel--a very tangible entity in the material order-and in the order of consciousness that highly refined principle which we call "righteousness". What inter-connection or inter-dependence can we see between the ingot of steel and righteousness? Here there is a greater distance, or less immediacy in relationship than in the previous instance. Hence there is a reason for combining groups together, so that we can speak

of certain groupings as being more immediate and more intimate than other groupings, yet, nonetheless, the principle $(3 - C\beta)$ holding between all groupings whatsoever. The ultimate statement of truth would be a hyphenation of all possible entities in the entire universe, but on that level it is not practicably workable, at least with us at the present. We lose the possibility of thinkability. Let us go back to our simplest form , (9-(3: (9-(9)). Bear in mind that can be expressed with any number of entities, ultimately all possible entities, but we are taking the simple form and dealing only with two entities. The relationship is reversible, or what we would call commutative, that is the fundamental fact. Now this principle is not proven, but stands logically as a primary postulate, a basic definition of the relationship. Yet it is not arbitrary in its origin. Actually it is grounded upon certain insights, or intuitions, but it is our starting point. We do not try to go back of it for any proof. It is a principle we apply in our logical development, henceforth, as the ground principle. You might call that then, the Holistic formula. subsisting in β implies β subsisting It 18 9 and is not a one way relationship. Now, of 1n 9 course, in psychosomatics we have taken a particular field and applied it there, but, ultimately, if we proceed to the final meaning of the Holistic, it has got to be applied

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to everything, not simply to the domain of human psychology and human bodies, but to the whole universe. And more than that, beyond the universe into the Transcendent.

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Now do you see why Srl Aurobindo speaks of this involving more than mind to be able to move upon this level. One place he leaves an opening for the mind where he makes that statement that the mind can, by being, what he calls, too abstract, say something that is true. Here we are trying to say something that is true. Now we have some implications that grow out of this. Let us see if we can find any system, any existences now recognizable of which that relationship is Well, first, we have case one, which is an obvious true. instance and it is not one of very much importance. It is 9 is identical with (S , or if a limiting case. If is identical with (\Im , \mathcal{A} , ∂ , and so on, so that all of your letters mean exactly the same thing, then obviously it is true. It is true in the case of a zone of absolute homogeneity. In the zone of a complete homogeneity it would be identically true. But this would be a rather unimportant statement. The "e is one other zone and this is where the work of last Sunday was preparation. It applies to this order of entities which we find in an infinite I will put down the numbers again--1, 2, 3, 4, manifold. 5, and so on to n to 00 ... Now we will consider other sets of elements, such as the doubles of each of those above, and then use 3 as a multiplier, and so on

> 1, 2, 3, 4, 5, -----2, 4, 6, 8, 10, -----3, 6, 9, 12, 15 -----

we could get, by using all of the numbers as multipliers, an infinite series of these lines of numbers, everyone of the numbers in these lines being found in the first series. Yet we set up a one-to-one relationship between the members of each series and the first series and that establishes equality or similarity between classes, or what we know technically as "establishing identity of cardinality". Hence, this series 2, 4, 6, 8; 10 has the same cardinality as 1, 2, 3, 4, 5 and there would be an infinity of such series that would have the same cardinality. All of these derived series would be proper parts of the original series, yet each one having as many terms. We could set up other relationships such as the squares of the members of the first series, or cubes of them, or the fourth power, and so on, through the infinity of all powers. We could set up other relationships and draw out other series, everyone of them infinite and everyone of them consisting of terms that exist in the original series. Now, you can, from any of these series, derive any one of the other series. For instance, if you divide the members of the series 3, 6, 9, 12, 15 by 3, you get the first series 1, 2, 3, 4, 5 -Divide the series 3, 6, 9, 12, 15 - - - - by 3 and multiply by 2 and you get 2, 4, 6, 8, 10 - you have a series of squares, which would be 1, 4, 9, 16, -, you can get back to the original by reversing 25

the relationship, taking the square roots of the members. Or you could get from this series to the series of cubes by taking the square root and cubing it. Thus you will have some relationship whereby everyone of these series is reducible to any other one you might select.

Thus we have an application of the principle that any series exists in any other series by means of some relation-Everyone of these exists in, or subsists in, or ship. interfuses every other one. The relationship holds here and it holds in the identity case previously noted, and these are the only two complexes where it could hold so is an abstract statement, or an abstract analogue. It is not an esthetic portrait. But what it means is, that the entities that have Holistic consciousness are of this sort. The sort that is represented by this analogue. They must all be infinite entities. I had not expected that outcome when I was studying this implication. I was not too surprised, but I was interested to find that the drawing of this conclusion from this former relationship led to this conclusion. Of course, Aurobindo says from the basis of Realization that the Supermental Being is an Infinite Being. From a different angle we make the same statement, but here we derive it as a deduction from the primary abstract relationship (d-(3:3-(d))

Now if we were, in reality, only finite beings, of course there would be no possibility by any means of growth whereby we could become infinite beings, because that would require an infinite time and thus would be out of the question. The only possible way of viewing this is, that our finitude is the result of an obscuration or occultation of our hidden totality. The Holistic impress. or impact, is the effort of that hidden Infinity to become manifest. How will this come about? We may consider three possibilities. (1) A gradual process all the way, (2) an instantaneous process, or (3) a combination of a gradual and gudden process. A gradual process all the way is out of the question for the simple reason that starting from the finite we never can by a series ^{OI}finite steps attain the infinite. That is the lesson we should have learned when we studied the googolplex, for that is only a finite number. Now, if we are going by the gradual process we will have to go past the googolplex and then we must consider the fact that we are no better off than when we started at (1) in our approach towards infinity. Thus the gradual process is impossible, save as an initial stage. There may be an initial preparation followed some day by a radical over-turn and then one will discover the hidden fact that he was an Infinite Holistic Being all the time, The sixth patriarch was correct when but did not know it. he spoke of true Realization as being sudden. The gradual methods can apply to periods of preparation leading to.

favorable conditions, a favorable take-off as it were, a preparation of the consciousness so that it is not completely disrupted by the radical over-turn. Holding to something that maintains stability is necessary. Therefore, I suggest that here is something we can hold, something that remains invariant in the over-turn.

Now we may ask ourselves: Having arrived as infinite beings, what are the consequences? Does the finite disappear, is there no place for it? Or is there any way that we could re derive the finite? Yes, there is a positive answer to that. If you will notice, in these relationships I wrote down, such as 1, 2, 3, 4, 5 - - - - -, and then taking just the doubles of them, 2, 4, 6, 8, 10 - - - - - , and so on, to infinity, that there is one number that can symbolize the relationship between these two, 1.e., the multiplying by two. Here we have endless infinite entities but we have one unit serving as a relating conception. We can have then, as it were, a collection of finite entities representing relatedness of infinite entities. May it not be, then, that what our finitude essentially is, is of the nature of a relating principle, and, hence essentially an unstable principle; that we are only the projections as it were from Infinite Beings of the relating principle whereby each Infinite Being stands connected with other Infinite Beings. We would stand then as the intersection point of infinities in our appearance as finite beings. I do not know whether you are following this

thinking right now, it is not too easy to say, and I imagine it is not too easy to follow. But we, as finite beings, may think of ourselves as the intersection point, the relating point, of Infinite Beings. Now if you will note, we have in this mathematical schema a way of reconciling infinitude with multiple individuality. Every one of these serieg-an infinity of them, --interfuse one another, yet nonetheless have a unique character, a unique character represented by the operating number. We have the Holistic Infinity composed of an infinity of individualities everyone of which is infinite, interfused and yet, also unique.

Now those notions could be expressed mystically and it might seem that all logic was thrown overboard and that the statements did not make rational sense. Well, what I am doing is showing that here is a logic which already has been worked out in the field of mathematics, such that, we can have conceptions which are interlocked and yet comprehended logically. In mystical language we hear the same thing said over and over again that parallels this pattern, but it is said generally without any knowledge of this, hence, it seems to be something sheerly irrational and arbitrary. As a matter of fact, when one becomes acquainted with the mathematics of the infinite he repeats the same pattern, and the implication is this, 1. e., that the mystic is speaking of what is essentially an experience of the Inifnite, and what he is reporting is concerning properties which are true and valid within the Infinite, yet the mathematician has already recognized these properties in abstract form, though usually not realizing that there is a profound religious meaning in what he has done.

Xes, a relationship between the finite and the infinite remains a possibility, and by adhering to the pattern we have elucidated we have something in this relationship which remains an invariant as we pass through the transition. The impact of the transitional force may impress one with a feeling like that of an earthquake, or a hurricane, or a cyclone in which there may be no orientation whatscever. It is very necessary, therefore, to have something that we can take hold of, as a handle, upon which we can hang until order is established once again in the consciousness.

Now I am talking of something that can happen, and we do not know when it is going to happen for it comes like a thief in the night. What we have done this evening is part of the preparation, --the abstract part--for the dealing with that impact when it comes. It will require the best prepared in their evolution and their own personal integration to deal with problems upon this level. This is only one side of the total problem. There are the psychological and the biological sides which are not in my domain and where the more direct work will have to be done, and where the operating consciousness must be predominately intuitive.

In fact in operation our adjustment will be largely intuitive, but I am giving here a formula that brings it, in some measure, within the field of conception, although it is a very abstract formula. The transformation will come in the form of profound religious experience, it is a religious problem. But it is also a scientific problem, a philosophic problem, and a therapeutic problem.

I said a few Sundays ago, that everyone here has three possible courses. He may take the course of the ordinary man in the world, and spend his life dealing with, and moving in, the worn out patterns, the essentially exhausted patterns of our racial consciousness, or he may achieve the Liberating Realization and abandon the whole domain of formation and take up his eternal residence in the Eternal Silence and Peace, or third, he may reach to this level and then return again to the domain of the finite to labor among those who are bringing into manifestation a new race, a race which, when it is finally established, will transcend mental man, -man as we now know him far more than present mental and cultured man transcends the animal. These are his three possibilities. One may choose which way he will go. There is the path mediocrity, living a life that is meaningless-mach-time-march--because the possibilities have essentially been exhausted and all he can do is repeat the patterns. There is the Path of Liberation in the Transcendent, away

from all formation, and a wonderful consciousness. Finally there is the Way of having reach to that Infinity, then bringing down that transcendent value into the seeming finite, thus affecting the transformation of this finite so that it also becomes Infinite. Now I do not know what an Infinite matter would be, our experience of matter is as something finite, but if in its totality it is Infinite it certainly will be something different from what we now know, when thus realized. And the same with life, and the same with every other quality. The transformation when completed means a life in the Infinite at all times, yet manifesting that Infinite. I can only give the logical schema, I could not possibly paint an esthetic representation. That only the Realization itself could give to That I think will be enough for this evening. one.