Mathematics, Philosophy, and Yoga

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Since we were last here, I've been drunk most of the time, though not with the wine of the grape, but of that other wine of which the Persian mystics sing. And I glanced at the dance of thought upon the stage….[1]

I saw Descartes lying in bed 'til noon flirting with analytic geometry, and thus was born modern thought, both mathematical and philosophical.

And I also saw a young man of twenty-four, or so, deeply infatuated with *Principia* so that he forgot to eat and to sleep, and out of this one's thought there came the score to which all engineers today dance. This one known as Newton so loved his *Principia* that once it is said a friend came to see him, and his sister, who had no power over him, prepared his breakfast, and left it on the table. And as the hours went by, the friend got hungry and ate a little of the breakfast, and a little more, until he finally had consumed it all. Ultimately, down came Sir Isaac—not a Sir then—nodded to his friend and went to his breakfast, and he said, "I thought I had not eaten this morning, but I see that I must have." So it is with the dancers of thought.

And another, who knew all there was to be known in the Western world, in the Western knowledge, and the last who knew everything, who, too, brought to birth great mathematics and philosophy. This is Leibniz.

And I saw Weierstrass with his *chela* Sonia, who became the greatest of feminine mathematicians.

And then again, there was the Hilbert, top mathematician of his day, giving a lecture to his students, and he got stuck. He couldn't figure out what 6 times 7 was. And the students, quite helpfully, one of them called out 41, another 43; and he said, "Gentlemen, gentlemen, I'm sure it must be unique." And that illustrates a certain point. Rarely are mathematicians good computers. The two abilities are not the same.

And I looked across the world at another one in a foreign land—one who could well have been the mathematician of mathematicians—a boy who marched up and down India putting all of the Brahmins in a state of great disturbance, even kidnapping the husbands of wives, and making them become *sannyasins*. For some strange reason, the wives did not appreciate this, but they had no chance—no choice except to get on the bandwagon. And that one with the wand of his logic made the world of appearance to disappear so that in its place there was naught but God. And here is a powerful logic. He taught that when one realizes a given condition is an illusion, it not only ceases to be, but ceases to ever have been. Perhaps you can see this if I suggest to you an experience that

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[1] There seems to have been a tape recorder malfunction here.

can happen very readily on the desert. You travel across the desert wastes and you perceive a beautiful lake, the water looks so refreshing in the midst of that heat, and you go toward it until finally something is strange about it, and you recognize it is a mirage. Did the lake just then cease to be, or did it also cease to ever have been once it was recognized as a mirage? Or again, perhaps you're wandering over the desert wastes, and you see a snake and jump, and then you perceive that it was a stick, of a piece of rope, or some other sinuous object. Did the snake merely cease to be at that moment, or did it cease to ever have been? Think about it.

Last night I took you over two theories of the nature of mathematics, one which is known as *logisticism*, the other as *formalism*. One connected particularly with the name of Bertrand Russell, and the other with Hilbert. There is a third one that is current, projected largely by Brouwer and Weyl, known as the *intuitional* theory, though why it should be so called is not too clear. And these throw out large bodies of mathematical thought that's current today. They even doubt the validity of applying the dichotomy to thought about the infinite, and much of the development of the transfinite has been based upon a certain principle often used in mathematics. It may often so happen that you cannot prove directly that which you seek to prove, but you know that there's a limited number of alternatives, perhaps only two, as for instance, you can say that all numbers are either prime or not prime. If you cannot prove that a given number is a prime directly, you might prove it by proving that it is a not a not prime. But Weyl and Brouwer maintain that this principle which involves the assumption of excluded middle is not valid when thinking with respect to infinite classes. It's a thought that may have some importance, at any rate. But, however, I wish you to note this fact that among mathematicians themselves there is not agreement as to that which they are dealing with—as to its ultimate nature. Agreement as to detailed process; but as in logic, while there's agreement as to the proximate subject matter of logic, there's much disagreement as to the ultimate subject matter. And so we have here disagreements as to what is the essential nature of the mathematical subject.

Now, I'm not too sure that the mathematician who is only a mathematician is the one to say. I quoted a statement of Weierstrass where he said that the mathematician who is not also something of a poet is not a complete mathematician. I'd like also to say that the mathematician who is not something of a philosopher is not qualified to say what he's dealing with. There is one, a philosopher, one of the two greatest philosophers of history that we know. I refer to Spengler, who had been a teacher of mathematics in the gymnasium, not in a university, not a creative mathematician, and who wrote that famous book, *The Decline of the West*, which once had practically the whole intellectual world at its feet. His first chapter after the introduction is devoted to the meaning of number, and here we find what I think is a far deeper grasp of the essential meaning of mathematics than has been presented so far. In this case, I'll quote to you certain passages that I've written out from Spengler. This man wrote during the First World War and died at 57 after the Second World War. How ever any human being could acquire the encyclopedic

range of his knowledge in the few years of life that he could have had before he wrote is indeed a mystery.[2]

> In order to exemplify the way in which a soul seeks to actualize itself in the picture of its outer world—to show, that is, in how far Culture in the "become" state can express or portray an idea of human existence—I have chosen *number*, the primary element on which all mathematics rests. I have done so because mathematics, accessible in its full depth only to the very few, holds a quite peculiar position amongst the creations of the mind. It is a science of the most rigorous kind, like logic but more comprehensive and very much fuller; it is a true art, along with sculpture and music, as needing the guidance of inspiration and as developing under great conventions of form; it is, lastly, a metaphysic of the highest rank, as Plato and above all Leibniz show us. Every philosophy has hitherto grown up in conjunction with a mathematic *belonging* to it. Number is the symbol of causal necessity. Like the conception of God, it contains the ultimate meaning of the world-as-nature. The existence of numbers may therefore be called a mystery, and the religious thought of every Culture has felt their impress.[3]

Again:

> In number, then, as the *sign of completed demarcation*, lies the *essence* of everything actual, which is cognized, is delimited, and has become all at once—as Pythagoras and certain others have been able to see with complete inward certitude by a mighty and truly religious intuition.[4]

> The style of any mathematic which comes into being, then, depends wholly on the Culture in which it is rooted, the sort of mankind it is that ponders it.[5]

> The Australian natives, who rank intellectually as thorough primitives, possess a mathematical instinct (or, what comes to the same thing, a power of thinking in numbers which is not yet communicable by signs or words) that as regards the interpretation of pure space is far superior to that of the Greeks. Their discovery of the boomerang can only be attributed to their having a sure feeling for numbers of a class that we should refer to the higher geometry.[6]

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[2] Actually, he died three weeks before his fifty-sixth birthday. The first volume of *The Decline of the West* was published when he was thirty-eight.

[3] Oswald Spengler, *The Decline of the West* (New York: Alfred A. Knopf, 1926), 56.

[4] Ibid., 57.

[5] Ibid., 59.

[6] Ibid., 58.

The Mathematic goes beyond observation and dissection, and in its highest moments finds the way by vision, not abstraction.[7]

Here, then, is an interpretation that number is a basic form of expression of the soul of a culture; and that there is not one mathematic, but many mathematics; that our knowledge of this field has not been a continuous line from the Babylonians, through the Greeks, through the Arabs, on up to our present—one subject, one meaning throughout, not at all. The numbers of each culture have a different meaning as he points out. For the Greek, something sharply demarking bodies. The Greek was not oriented to space, but to these tangible hard surfaces—bodies, that could be sensed; and their number was, thus, largely the simple integral number plus the fractions. And when Pythagoras had that nerve shattering experience—you may remember his theorem that the sum of the squares on the legs of a right triangle is equal to the square on the hypotenuse—something used by every carpenter today to square his building. So he took the right triangle of equal legs, denominated a single unit, and by that theorem the square on the hypotenuse is 2, and the length of the hypotenuse is the square root of 2.

$$a^2 + b^2 = h^2 \qquad\qquad 1^2 + 1^2 = 2$$
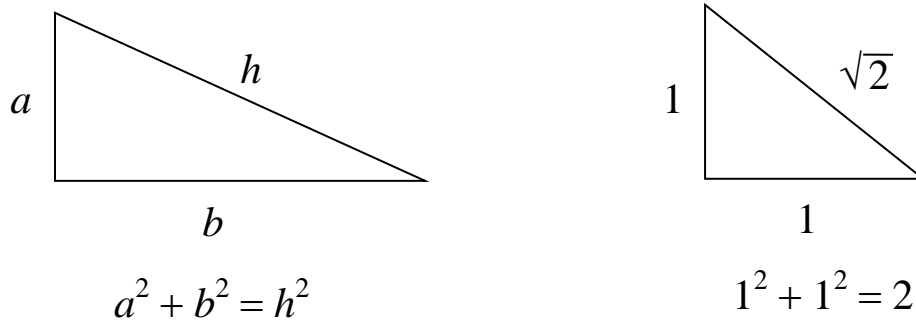
And here he had a demon by the tail, as it proved later—a number that could not be expressed in integral or even rational fractional terms. Here was a strange thing, a thing which should not be. It was part of the esoteric study of their order, and later the news leaked out as to what the Pythagoreans were doing—studying devilish things like the square root of 2. They were persecuted and lynched.

Now, that may give you some idea of how important number can be in a culture. Spengler, then, has pointed out that our real number is not this number of the Greeks—though, practically, the layman knows little else even today—but the number that belongs to our culture is the notion of function, relationship, and not of references to clearly defined bodies. It is a thought that moves towards space. What would this [$y = ax + b$] mean to the Greek? Nothing at all. Of course, I don't expect all of you to know what those symbols mean. That's not a thing that you can reduce to any simple numerical conception. It implies functional relationship, a movement of consciousness away from hard form into the intangible. The whole notion of function is the very essence of the modern mathematic, written that way commonly—a relatedness between two or more variables. All but one independent, one dependent, and they flow in

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[7] Ibid., 61.

relationship and do not define something specific. Corresponding to the mathematic of a culture is the art of the culture; the commerce of the culture, its economic outlook; the money of the culture, which for the Greek was hard coin, and as Spengler puts it, for us is really double-entry bookkeeping.

Now, here would be the theory of Spengler's: that the number style that a culture evolves is the expression in a most fundamental way of the soul of that culture. This, I think, is far more profound than the other conceptions that I've given before, and I have my own interpretation. It is simply this, that mathematic is that portion of ultimate truth which descended from the upper hemisphere—to use the terminology of Aurobindo— into the *adhar* [8] with minimum distortion, and thus becomes the Ariadne thread by which we may ascend again most directly, most freely. Perhaps not all mathematics; not this soulless, substanceless mathematical positivism that is the style of the day, a relationship between empty symbols that mean nothing with which you simply play as the formalists say, or merely an empty logic that ties together no substance that destroys all vision. The great mathematicians have been guided by "vision," most commonly, and that vision is not far from the sense of a profound religiosity. It is very true as Novalis, the German poet, said, "The mathematician is the enthusiast *par excellence*." [9] He is the dancing figure in the world of thought which leaps not only into vast spaces, but even into the infinite itself, and remains at home there. Sitting in his ivory tower, he thinks with no thought of any practical use, and sooner or later the world outside moves according to his thought.

Now let us drop mathematics for a time and step on into philosophy, for these lectures are on mathematics, philosophy, and yoga. There is a little story we might take up at this time. I heard it given on television in a conversation with the physician Dr. Paul Dudley White—one of those conversations that they sometimes gave with distinguished men. And he spoke of this fact, that the art of medicine was based upon certain sciences such as anatomy, physiology, pathology, and so forth; and these scientists looked down their nose at the mere doctor; but the biochemist looked down his nose at this anatomist, physiologist, and so forth; and the full chemist looked down his nose at the biochemist; and the physicist looked down his nose at the mere chemist; and beyond the physicist, the mathematician looked down his nose at the latter; and then the philosopher looked down his nose at the mathematician. But, said Paul Dudley White, when the philosopher gets ill, he has to call in the lowly doctor. Now, does the *yogi* look down his nose at the philosopher? I won't answer that. We'll leave that open.

The thought of the pure mathematician is a thought in form and not concerned with the meaning of what he does. To unearth the meaning, not only of mathematics, but of all art, and all the activities of man, all his functions, is the office of the philosopher.

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[8] Aurobindo Ghose, *Letters on Yoga*, vol. 23 of *Sri Aurobindo Birth Centennial Library* (Pondicherry: Sri Aurobindo Birth Centenary Library, 1970), 1128:"The Adhara is that in which the consciousness is now contained—mind-life-body."

[9] Robert Alfred Vaughan, *Hours with the Mystics* (New York: Charles Scribner's Sons, 1893), 349:

> He declares the genuine mathematician the enthusiast *par excellence*—mathematics is the life of the gods—it is religion—it is virtual omniscience. Mathematical books are to be read devoutly, as the word of God.

That's why Spengler, I would say, understands mathematics far better than the professionals who are not philosophers. The main field, the primary field of a philosopher is *meaning* and *value*, otherwise all things might be empty and void of meaning and value. In its broad sense, it is the source of all science. William James, I think quite truly, once said that whenever the philosopher begins to get definite answers to any of the questions that he puts to nature, then a science is born, a limb out on the tree of thought. And so many such limbs, through the course of time, have become separate disciplines, out of philosophy originally, but now in a measure on their own. Sometimes these children get quite arrogant and think they're sufficient unto themselves. However, if they are wise, they'll need philosophy to tell them what they're doing. There ever, thus, remains to philosophy the field of the questions for which there are not yet definitive answers. And there are certain fields that thus remain, a few in number: logic, ethics, aesthetics, epistemology, and metaphysics. This is philosophy in the technical or narrower sense. Now, of all these disciplines, the one that comes to us of peculiar importance is the one that has that terrible name, epistemology. And to bring out why this is so and how it was born is a matter of very great importance, as I see it, and I'll now digress into something of the philosophical story.

Throughout the most of Western thought from Thales, say, down to Descartes, there was no clear distinction between idea and thing. As Jung would put it, the psychological sense was not yet born. But with modern philosophy starting with Descartes, we have a complex story. Descartes founded a school known as Rationalism to which the idea of *innate ideas* was very fundamental. It was very much akin in its method to mathematics, which was part and parcel of Descartes' own consciousness. And the second figure was another great mathematician, Leibniz—one of the co-discoverers of the infinitesimal and integral calculus, along with Newton, but quite independent of Newton—a man who developed certain conceptions like the Monads, representing us as existing here without any windows but operating under the action of a preestablished harmony, a conception involving the notion of parallelism rather than of causality—and incidentally I might say that Dr. Jung finds the conception of parallelism very fundamental in much of depth psychology. And following him, that religiously oriented thinker Spinoza, who, though not a mathematician, tried to write in the form of geometry his conception of ethics—a substance philosopher *par excellence*. And finally Christian Wolff, with whom Rationalism took final crystallized form.

But there was another branch, another wing. Something was pointed out by Galileo, and again reaffirmed by Sir Isaac Newton, that in matter—now we go back to a primitive view of matter—there are certain qualities that belong to an impersonal, common objective world; and these are the mathematical attributes. But such things as color, smell, sound, and all of the various other qualities that may hit our senses, would not be there in matter if there were no observer—that they are in a sense a result of a stimulus from the material object causing a reaction by the conscious being so that he projects back these sensuously apparent properties.

And John Locke now comes on the scene, and after trying to handle some philosophic discussions in which it was obvious that nobody knew what he was talking about—they used words without clear understanding of their meanings, and each man with a different meaning attached to the words, the discussions were not constructive—

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came to dwell upon the problem of what is it that we really know, and he concluded that we only know the sense impressions that strike us and that we are born with a blank tablet for a mind—and it's for that reason that the Founders of this country postulated that all men are born equal, namely, with equal blank tablets. Our doctrine of democracy comes from John Locke, recognized explicitly by Jefferson in many of his letters. But Locke assumed that there was such a thing as a mental substance and also such a thing as a material substance, not something that anybody actually contacted at all, but it seemed that such substance should be predicated as the matrix in which the various qualities existed.

Following him there was Bishop Berkeley who saw there was no need of keeping the conception of a material substance. Since all we ever experience is the impressions on our senses, why predicate a substance at all? So he suggested that these experiences of an external world are merely impressions imposed upon our minds by God. But he kept mental substances. Being a Bishop, I think he had to keep the idea that there was such a thing as a human soul.

But there followed him the Scotchman David Hume who had no such qualmishness, and he thought the matter through further and found there was no need of keeping the mental substances; and, thus, there is left merely the play of ideas and a play of sensuous images and the association of sensuous images, and that's all we've got—a world that is nominalistic, phenomenalistic, and positivistic. With him it was a manifold of impressions, not a continuum, and so you get a picture of a world that is only these impressions playing. He didn't quite like his own philosophy. He says at times it was very disturbing, but he was a good logician and he carried through. He said when it got too disturbing, he used to play a game of backgammon, and then go back to it again. He said—and this is quite logical—no impression of the sun rising, even though you see it a million times, gives you any good reason for assuming that it will rise tomorrow. Quite correctly, if all you have is sense impressions and the association of sense impressions, you have no assurance of the existence of any underlying law.

Now, this was absolute Skepticism, and the other wing that I outlined, that of Rationalism, wound up in sheer dogmatism. And that was a bad state. But now appears the philosophic master of them all, Immanuel Kant, who had been contentedly sleeping and accepting the rationalistic philosophies that had been handed down, and teaching science, developing theories like theories of the structure of mountains and how they were evolved without ever having seen one, and theories that stood up, and so on—really quite a scientific mind after all. But Hume hit him hard and woke him, as he said, from his dogmatic slumbers, and he pointed the way out. And in the *Critique of Pure Reason*, the opening words are these, "No doubt all our knowledge begins with experience, but it does not therefore follow that all knowledge comes from experience."[10] In other words, experience can be the occasion when that which is latent within the consciousness of man comes forth. And he asked a very important question, "How is pure mathematics possible?" On the basis of the position reached by David Hume it had been definitely

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[10] Immanuel Kant, *Critique of Pure Reason*, trans. Norman Kemp Smith (New York: St. Martin's Press, 1965), 41. The text actually reads, "But though all our knowledge begins with experience, it does not follow that it all arises out of experience."

shown that if that were the truth, there could be no mathematics at all. But mathematics is an indubitable fact. After all, though it may be the creation of the pure mathematician in his ivory tower, it gives us command over events in nature and it can make a difference in the play of these images. The automobile going down the street exists because of mathematics, plus something else, but you'd never make it without mathematics, and it can definitely make a sense impression that's different from what would be if it were not there. So you can't deny that mathematics is and that it is a power. This then emerges not from experience but from the depths of the consciousness, drawn forth upon the occasion of experience that stimulates this process.

That's saying a very little concerning a very great book, but now is born for the first time the serious study and analysis of the knowledge process itself. Here epistemology is born. We see, as Kant puts it, the world as it is conditioned by forms of the transcendental aesthetic, sensuous forms, and these are space and time, and by the forms of the understanding, which includes the whole of logic and something more. These determine the form of our experience but not the nature of the thing-in-itself, the *ding an sich*. And here we have this distinction between the psychical side and that which we may imagine exists out beyond. Is there, then, a thing-in-itself existing out beyond becomes the question. We do not know it. We are bound to the forms of our perception and understanding and experience a thus conditioned world and not the world as it is, whatever that may be.

On the side, I might say if you ever read Dr. Carl G. Jung, remember that he read the *Critique of Pure Reason* when a boy of seventeen, high school boy, and assimilated its profundity and never forgets it in his writing. He clearly distinguishes between the psyche, which contains the whole of what we know, as contrasted to a possible world beyond. We see images about us. We call them houses, trees, mountains, and so forth, but actually what we have are these "imagos" in our consciousness. We do not participate in the supposed actuality of an external mountain, or houses, trees, people, and so forth. Are you, for instance, merely images in my consciousness? Not an easy question to settle. Perhaps—and you might each one say this for yourself—perhaps I'm all that there is, and these people about are only images flowing in my consciousness. That's known as Solipsism. Answer it if you can. Schopenhauer acknowledged he couldn't. He says it's a fort we cannot take, so we'll move around it and ignore it.

Now, if you're going to understand Jung you've got to bear that in mind. When he speaks of the imago of God, for instance, he says that is very, very important in the life of man. This we know. But he does not, when writing professionally, say that God is, in a metaphysical sense. He doesn't say that he is not. He affirms and denies nothing, because as a scientist he's not qualified to do so. When you read his personal confessions in the book that is the story of his subjective life, and which he would not allow to be published while he was still living, you get another picture; but as a scientist he was very careful, and you'll have to bear that in mind when you read him. He's not affirming or denying the metaphysical reality behind the imago. He says yes, I believe there is such a thing as matter, but he doesn't know it. It's a convenient hypothesis—a matter in the sense of the thing-in-itself. But now suppose you predicate—and study this for a moment, and this is very important—suppose you predicate that there is a thing outside there, a perfectly nonconscious thing outside the field of all consciousness. What is the good of that

predication? You can never verify it. You might say it's convenient to assume that there is something out beyond all consciousness that holds together these experiences, for they certainly seem to be objective. Others beside myself orient similarly to them, hence they're not purely a private, subjective thing. Granted, but all you need to have is something that maintains the source of these images in a persistent form. Berkeley found that in the conception of God, and these ideas are implanted there. But the God he spoke about disappeared with the more acute analysis of Hume. It was merely his prejudice to affirm that. I suggest that there is another possibility, that in this collective unconscious of humanity there is that which is held in common, and hence we experience and can speak about the same objects, and it need not be there as a nonconscious existence. Now, I'm not affirming that that nonconscious existence is or that it is not, but we cannot think intelligently and critically if we either affirm that it is or is not. It is useless; it's not within our experience.

Now, if you'll read the Buddhist *sutras*, you'll find that—assuming that they are a reflection of the teaching of the Buddha—he speaks like that and points out in quite acute discussion that there's no need for a substance to support the qualities which we experience. That is something no one knows. We know the qualities, but not the supposed substance. And the result is that much of Buddhism is nominalistic, phenomenalistic, and positivistic. I don't say it all is, because there are at least 5000 volumes—maybe more, I've heard 10,000—in the canon and only a little of that could anyone assimilate. So, to give you a reason or a deeper respect for the point of view that there is no thing behind the appearance, bear in mind the Buddhist *sutras*. Read them sometime. This is found in what is known as the *Shunyata* philosophy, the Emptiness philosophy. There is also a non-*Shunya* philosophy. For myself, in *The Philosophy of Consciousness Without an Object*, I take no definitive position, but I do say this, be consistent—either take a negative attitude towards the existence of all metaphysical entities corresponding to the imagos of our experience, or a consistent acceptance of them. Now, many people affirm that these imagos of our ordinary senses correspond to an external matter. Actually, to affirm that there is matter out there is a metaphysical affirmation. But when there appears, as sometimes there does, the divine imago—perhaps an appearance of Krishna, of the Christ, of the Buddha, or some other holy one—these same people say that's a hallucination, that is only an image and nothing more. I say this is not consistent. If you're going to hypostasize a matter that is nonconscious out there, it's utterly unreasonable to refuse to affirm an equal metaphysical objectivity for these imagos of the *numen*. Do you get my point? And when you come up against a materialist, you can tear him to pieces on that logic; you can show that in his prejudice, he's not logical. Be consistently affirming only that which is within the field of experience and of consciousness, or if you hypostasize, view as externally, metaphysically existing in one domain, do so in the other, for there is no logical justification for not doing so.

Now, the difficulty here, the reason why we cannot come to a decision here, inheres in the dualistic character of our knowledge. We have only two organs of cognition, as I pointed out before, sense perception and conceptual cognition. What all this mass of thought down the years has brought to recognition is this fact: that so long as you deal with only those two organs of cognition, you cannot know beyond the appearance of things. If there is a reality beyond the appearance of things, that must be otherwise cognized. And that there is such another organ, function, or faculty is the

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central thesis of my manuscript volume *Philosophy of Consciousness Without an Object*. It is maintained there, and that is based upon experience, that there is an organ of cognition akin to that which Fichte called the "inner organ," or Shelling "intellectual intuition," or the Hindus the "*samadhindriya,*" the inner sense. This organ, latent in most men, can under the right conditions be activated, and with its aid some answer as to whether there is a soul or a substance behind things can be secured. Yes, there is a positive answer too, but that you must learn for yourselves as you travel up the way, and take it not on the word of any individual.

We have now a little picture of what philosophy can do. The mathematician is like an artist playing with his forms, a conceptual artist, who like the musicians, the painters, the sculptors, and the other artists, often does not know what he does. One of the great artists of all time, namely Richard Wagner, knew this, frankly said in his autobiography that he did not appreciate all that he did in his art. And Jung points out that often the artist goes far beyond his own understanding, for his artistic sense guides his hand rather than his understanding mind. But it's the business of the philosopher to bring the understanding that the artist lacks, and in this sense I'm speaking of the mathematician also as an artist, a conceptual artist. And that, then, is the office of philosophy: to understand, to reveal meaning, and value. Otherwise, all we have is an empty game meaning nothing, like that of the logicists and the formalists.

Now, I think that'll do for tonight. We'll meet again tomorrow night, after that the following Saturday and Sunday. Tomorrow night, I will meet you. Now, if you'll rise we'll close with the closing words.

> Let there be peace within the universe.
> Let the power of the warriors of light be made manifest.
> Let wisdom guide us and love protect us throughout our lives.

> Peace be with you.

> And with you, peace.