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LECTURE TWO:
"PHYSIOLOGY OF HUMAN INTELLIGENCE"

JL: As Socrates said one day to young Theaetetus, "Thought is a discourse that the soul holds to herself on the object she is examining." An extraordinary definition which has never been surpassed but which leave in the shadow something even more surprising and that is this discourse that the soul holds with herself has some meaning about the outside world. How it is possible that what we think has some relationship with the world as it is and not as we are. There are two theories to explain that -- the one of Democritus and the other of Engles. From Democritus, ther intelligence is a fruit of chance. It's only a codifigure of the evolution. And then if everything in nature is due to chance and necessity, hence, human mind and human reason is also the result of chance with no operant necessitated. But if we accept that thing, we are obliged to suppose that evolution had a fantastic predictive power because human reason give us an extraordinarily strong hold within the world. We can describe the movement of the planets. We can even go and walk on the moon. We can send apparatus on

other plants. We can unleash the atomic energy. Then obviously we have with our reason an enormous power over the world, but how could evolution build progressively the brain, which would make those things possible, because human reason had no interest until by accumulation of knowledge during many generations then it becomes able to use its extraordinary power for scientific purpose. Then selection would have selected a system before the system could be used, and that is a very tricky system to swallow. Another possibility is that of Engles that, in fact, matter and energy and, so to speak, the universe, is pregnant of the spirit, and then by necessity and without any randomness spirit is obliged to emerge in some other, another part of the universe one day or another. That's an interesting thought which has the difficulty that you are obliged to believe in the ET, the extra-galactic individuals, and to the little green Martians with tiny antennas, which are not so much popular nowadays after the Mariner expeditions. Then we are left with that dilemma that intelligence is due to natural selection and has evolved by randomness or that it is a built-in property of matter. Then it's very curious that it appears only on Earth and not on all the others. Well, the way to go around that dilemma is existing. That is the spirit that

dictates the laws of the universe took the trouble of creating us at its own similarity so that now if we have only a little part of his own spirit it is not unintelligible that the universe is intelligible even partly. To put it in a very simple way, I will give you between you and me my strong feeling that the fact between materialist and spiritualist is foregone forever because between spirit and matter it is the spirit that matters. To make you understand that, I would tell you a true story and that is the story of mathematics. You read in the textbook that mathematics and especially geometry was invented in Egypt, and well, before the dam of Aswan was built with Russian money, there was a flood in the whole valley of the Nile so that after the withdrawal of the waters there was a very flat, level plain and what's more natural than to sit your pyramids on a plain. That is the way geometry came to the mind of the Egyptians we are told by the books and also with the necessity of finding again the borders of the fields when the stones had been removed by the waters. I have nothing against the ingenuity of the Egyptians, but I don't believe that story. Now, let me tell you the truth. The lovers, as you probably already noticed, spend long hours looking at each other's eyes. And that's so true that in every language of the world we

call by the same name this little round window that we are opening on the outside world. In Latin, in French, in English it is pupilla, which means the little girl. The Greeks are using the word cornea, which means little girl. And if you go around all the Mediterranean, you will find that no matter where you go it's always "little girl in the eye." Now, in Spanish you say "la nina de los ojos." It's very precise; it means "little girl in the eye," and if you go around the Arabic people say "insan ine." Now, you can translate immediately, "insan" is a living person and "ine" is the eye. So, it is very easy to speak the language of the eyes because it is the same language everywhere. In Iran, it's "the little man in the eye." And even in Ceylon they say "ali baba;" which means "eye baby." Human language is very simple once you know what you are talking about. You are talking about one of those deep secrets which have been discovered by women that when you look very closely inside the eye of the beloved, you see the reflection of your own face on this optical, spherical surface, which is the cornea, and also the entire face of the lens. That is probably the reason why most of the languages say "the little girl" and not "the little boy" inside the eye because it was discovered, this interesting property of the spheric mirror, first by the woman. But it

has a corollary that it can be truly spoken that love sees the child in the eye of the beholder, and that is true in any language. I remember one day I was in Paris with a good friend and there was a Jewish rabbi and we were talking about the pupilla, and I asked him, "What's the name you use in Hebrew," and he said "isha." I said "That's interesting. What means 'isha'?" He said it means the pupilla, but what it means really, but I don't know." Then he phoned home to his son to check the dictionary, and this dictionary was very clear. "Ish" is a man and "isha" is a woman. "Ishan" is a human being. And they were even more precise saying what you see in the pupilla is a human being, "ishan." Then it is built in the Israeli language that we were made "ish" and "isha" -- man and woman, He created them. But I was telling you that I was starting to tell you the true story of geometry. Well, to discover geometry, we have to accept the postulate that one day, possibly in Egypt, a mathematically gifted young man fell in contemplation -- those things happen sometimes -- and he discovered the following: The cornea, that is the transparent, outer face of our eye, is a little sphere which is increased, so to speak, on a big sphere, which is the ocular globe. The intersection of two spheres is a circle. On this circle are anchored the little shred of

the iris, and those shreds are held together by an orbical muscle, and when it contracts it reduces the aperture of the iris, and when the radial fibers do contract, they increases the opening of the iris so that we can increase the light coming in our eyes when the light is dim, and when the sun is very strong, we close iris. The Egyptian remarked that the eye of his beloved was reduced to a little point in the middle with radius going all around. If he had been a mechanic, he would have invented the wheel, but he was a mathematician, and he discovered suddenly that the orbicular making a tension of the radial fibers at the point of the surface of the iris were as it closes stripped from each other, which is the tonsorial definition of the plain. Now, that is interesting because just looking as a lover, he got immediately the only definition of a plain that the surface at which all the points are the closest to each other that they can. What Euclid discovered in a blink, that would help, I suppose, all the schoolboys just as they were taught the true natural history of mathematics. Now, if we want to go deeper how we discovered mathematics, we have to go forward and then a philosopher, Descartes, suddenly had a fantastic vision that he had described. It was in Holland with his "wahl," which is a room with a nice fire, and suddenly he

had a vision that you can procure yourself and you will, like he did, discover analytical geometry. Do that when you have time. It is very easy and remarkable. You have to lay down in your bed where there is not too much light and you have to be very relaxed. Now, with your two fingers you will have to make a pressure on your eyelids. Not directly but just by stretching them so that you can modulate exactly the pressure. Suddenly, you will have impressions of light that are called phosphene, and everybody has seen that. But if you do it very precisely, there will be a moment in which all your field of vision is filled up with tiny squares, alternately red, purple and dark gold and purple, and they are exactly put on the vertical of your body and the horizon of your two eyes, exactly like a chessboard. Extremely precise. And that is very interesting because what discovered Descartes was that he could define one point by the number of columns and the number of lines that you have to count in a chessboard to define one case of that chessboard. That's interesting to see that in order to press your eyes when you are a philosopher you have to have some doubts and then you press your eyes to see if you have well seen, and we know that Descartes was doubting. But we can go faster now and deeper. Well, if we come to the retina, which is inside

this ocular globe, we will see that the cells which are of the temporal side send axils, let's say nerve filaments, to the opposite part of the brain. Those that were on the temporal one goes directly and those that are on the nasal one goes across. That is very intriguing because if you look at the separation between the two fields you see a perfect meridian which makes the division so that the geology and the way of geography defining how you can put one place in a globe is already built in in the geometry of our own retina, which is a sphere. But going deeper, we see the crisscross of the nasal port of the information, and then we have the first rejection ever found in the universe. And, finally, if you follow the nerves going very deep inside the brain, they finish in the back of our head in the calcurian (?) zone, which is the obscure center that sees so that, in fact, we have a kind of television set. We use or lens; we use our sensitive surface, which is the retina, then we send by cable a special television program and the screen is inside our head. You cannot see the screen, but the screen make you see. That is the gross anatomy, but if we look at the very fine anatomy once we are there in the calcurian system, then we will see that the cells are not randomly arranged, and their connection with the retina is extraordinarily precise but there are

reacting like, so to speak, isomorphic system, that is representation is analyzed among very precise ways, and progressively we discover those columns, those lattices, and all the concept that the modern algebra is now discovering. And the curious phenomenon for the biologist is that if we look at this little trick that we did in our visual system we will find first the Euclidian geometry, the one of the lover. Then we will come to analytical geometry, the one of the Cartesian system. Then you come back to the modern geometry with all the complex algebra, and a very curious phenomenon is that the steps in which mathematics has been discovered by human beings has been made in exactly the same order step by step as the impulse of light in coming to our own bodies and being progressively analyzed when going deeper and deeper in the brain. It cannot be by chance. Sequence of events are just the same. And then you have a first feeling of what I wanted to carry to you that maybe the greatest discoveries are just to try understand partly how we have been made; that intelligence is built in not only on a theory nebulous (?) about the mind, but it is on the architecture of the way all our systems, nervous and all the rest, have been made. Now, I am not going to give you a talk about the central nervous system. Actually, it is exceedingly

interesting. But, to be short, we can say that every point of our bag of skin, as said Aristotle, is represented inside the brain. That explain now why Aristotle said you should not believe always your feelings because sometimes they are wrong, they make mistakes. And you know the story; he was at table with his disciple and he was awaiting the next service and he had made a little ball of bread inside his finger, and he was rolling this little ball on the table. Sometimes the philosopher has distractions like that, and he was really just feeling this little ball, and suddenly he had the idea of crossing the medius of his index, and suddenly he felt there were two balls and he could see there was a new one. Then he said you should not believe your bag of skin because maybe it tells you wrong. No, I am sorry for Aristotle, but his bag of skin was correct and Aristotle was wrong. Because in our brain, all the skin is represented point by point, and if you were looking about the representation of our body, you would see all the body on the parietal ascendente that is one of the parts of the body, like a person lying on a bed. When you look at the place where the hand is represented, you will find in this order the thumb, the index, the medius and the others. Now, when you have a little ball that is running between your two fingers, it

comes to the side of the index, which is the middle finger, or to the side of the medius, which is the thumb. Now, when you cross it, cross the fingers, then now the ball comes to the part of the medius which looks at the little finger and to the part of the index which looks at the thumb. Now, if you go back in your brain, which is not crossed, which is direct, now you would be sure that it is impossible that the same ball is fitting those two places which are distant by the space of the fingers, so your brain tells you there are two balls, and your brain is right. Just as Aristotle was wrong, you should not cross your fingers if you want to believe them. Well, I have just visited two systems of the exploration we have -- the vision and the tact -- but we could have been inside the ear, and we would have found there the space and the time. That is a marvelous visit. It was made in two different steps -- one that you know but you don't know the true story and the other that you don't know but the story is true nevertheless. The first is a story of Newton. You know that Newton was lying under an apple tree, an apple was falling, he was looking at the moon and the sky, and suddenly discovered that the moon was attracted by the earth like the apple was and discovered gravitation. Well, it was not like that. It could not be like that because

when you are under an apple tree and an apple is falling, you don't see the apple, you hear it crossing the leaves, and when you hear that noise, there is only one thing that you can do and that is to stand up to see from where is coming the danger. And it what did Newton. When doing that, it changed the position of his head, so inside the inner ear he had those little crystals which are floating inside the semi-circular tubes which were coming on different points so that it could have at the same moment, a notion of speed, of position, of inertia. Then he have all the ingredients to put in the formula of the general gravitation. If he had only seen the apple, he would never have invented gravitation, but he felt it at the moment he was thinking about it, and then suddenly he discovered that space is, so to speak, the frame of the possible, and when he moved, he realized that the time is a measure of reality. But a little before, just very close anatomically speaking but not that close geographically, and nearly a hundred years earlier, Galileo had found quite the same thing at least using quite the same organ but using a different part of it. He was at that time interested by the acceleration of the object when they are falling down. At that moment, there were no good watches. There were no stroboscopy, no photography, and nobody could really follow

where was a given marble falling down at a given moment. Galileo got the very simple idea to make a kind of a slide, incline, so that now the ball, instead of falling directly, would run, and he was supposing that the speed with which the ball would be running would be comparable to the speed with which it would fall directly, and he was correct. Then how did measure the acceleration? By a very simple trick. He had a long slide, and he took the marble on one hand and then a little chalk on the other hand, and then he began to hum a song, and he was just putting the chalk at the place where was the marble when was coming back the tempo forte of the song he was humming, and he did it repeatedly. Then he measured the space that the ball had fallen during one tempo of the song; he made the mean, and he got the acceleration system. And we have the writings of Galileo. It's very true that he invented the law of acceleration due to gravity just by humming a song. Because the ear tells us with the cochlear system, that looks like a little snail, it gives us the harmony by the height of its sound, but it gives us also by that feeling, the notion of vibration, and it gives by a system that nobody knows exactly now how time is elapsing. We have the timekeeper inside the inner ear which tell us exactly the speed with which what we are observing is going. If it was

not a very precise timekeeping, we could not drive an automobile, we could not play tennis, we could not even cross a road because we have to calculate the speed with which that next automobile is coming and this calculation means that we have a timekeeper inside us, which is built in and which is working anytime we are wake up. We know that the music is coming to us by the cochlear nerve which give us music and the harmony, and we know that the nerve which comes from the system which is sensitive to the time and to the space is the vestibular. Now, if we have the space in the vestibular system, and time in the cochlear system, then what did Einstein was very simple. He was just relating those two nerves, the cochlear and the vestibular, to say we cannot make any science if we do not put together space and time. And, indeed anatomy had done that from the beginning of humanity because if you follow the cochlear and the vestibular nerve they are wrapped around in one nerve, the auditory nerve, since we are born so that, as others, Einstein just discovered the way he had been led himself, which I guess he did not know at that time. That is to show you that the greatest discoveries have their counterpart in the way we are, but what about reason? Where is that written? Where is the organ in which it plays? Well, here the best would be to go to the

artifact, the thing which has been made by man. And the best artifact to understand how reason can be built in is a little arithmetic machine of Pascal. You remember that to help his father counting the amount of money he should ask the people to pay to the king he invented a machine with little teeth on wheels, each wheel had ten teeth, and one wheel having made a whole round, one teeth could put the next wheel from one teeth again. So he invented the decimalization by wheels. This was an extraordinary achievement because it was the first time that it could be demonstrated that we could build in logic in matter if matter is logically constructed. This was the first demonstration, and progressively the calculating machine got more complex and the one that you probably have in your pocket is a tiny computer which is a thousand times more powerful than the little machine of Pascal. But, like the machine of Pascal, like the big computers of NASA, the one you have in your pocket, answer to the three necessity which were built in in the first machine and which are built in every machine which is able to mimic the human reasoning. That is there is a network which is logical by construction. Now they call it wiring, but it is a network. The second is there is a transmission at long distance without division. That one signal is obliged to go across

the whole machinery to another point of the machinery where it must go without division on the way. And third it's, let's say, gate open or close and never remain in between. That's the reason why the binary logic can be used to make computer. That's very interesting because at the deep of every machine which is able to simulate one of the functions of our mind is written yes, yes, and no, no. All the rest is coming from the devil. It took 2,000 years to inform people to realize that it was definitely true that if one part of the machine does not answer yes or no, the whole reasoning is ruined. But our machinery is much more complex than the biggest computer that they have already built. To give you an example, if we count the nerve cells in our brain, there are around 11 billion. That's a big number. But what is really one gate is not one cell. It is the junction between the ending of one cell and the beginning of the next cell. It is the junction between the operization of an action and the operization of dendrites. Now, if we count those, which are called synapses, which means the point at which two fibers of neurons are meeting together. If we count them, there are on some cells thousands, and others only hundreds, and others 10,000 or more. Then as a mean, we have probably more than thousand synapses per neuron. That is now we have to multiply by

thousand the 11 billion we started with. That makes a machinery that is much more powerful and complex than a big Cray-1 or even Cray-2. I don't know if you know what is Cray. It is a big computer, refrigerated, enormous and costing I cannot tell how much, but billions. The length of the network is really impressive. If you measure it by the filament that you can see under the microscope, the length of the network on an ordinary brain, one liter, one liter and a half, it's around from here to Tokyo, putting end to end the fibers that we can see with the ordinary microscope. But if you look inside the fibers, you will see that there are neurofibers inside, and there are bundles of them which run from a dendrite to the end of an axil and that is the true wiring, the informatic wiring. And this one, if you are taking the filament, putting end to end, it would go to the moon and back. But we are really an astronomically complex network which is at your disposition, which is just at your benevolence. If you want to use it, it is ready to you. I'm not going to tell you that we are looking like machines because thinking that our brain is like a big computer, it is going nowhere because it is our brain which has made the computer and not the reverse. So, there is no surprise that we find on computer some of the law under which our own brain is

working. But it's not the computer that has made the brain. And you are obliged to recognize that the people who tells you that machines are thinking are just thinking mechanically. At the inner of those synapses, we find an extraordinarily little devil, the devil of Maxwell. Maxwell had invented that in order to make some order in the universe we could have a little devil which could be at a little door that we could open or close when a given molecule was coming at a given speed. Now, if you have two different containers and a division between them and a little door, when he was having very speedy molecule that would open it but if the molecule would be slow it would close it, and finally it would have two different temperatures starting with a identical temperature in the two vessels so that it would now make a machine and have energy which cost nothing. That devil of Maxwell was really a contradiction to all the law of thermodynamics although it could not be proved to be wrong, and for a long time, physicists were not happy about that theory. But we know now the devil of Maxwell really does exist in the way our synapses are working. When what we call a chemical mediator comes from one cell to the next one it opens very tiny little gates, and the angled ions, one by one, calculating the size of the ion and the charge of the ion

come through inside the ion and they show up in the ion. It does exactly what the devil of Maxwell. Now, that is very agreeable because it tells us that the price of physicists, Maxwell, invented the devil that everybody was thinking was just a mistake. It was an embarrassing theory, but this devil exists really, and our brain, our machinery to exclude the fortuitous and return the deducible, it a counter of particle of an incredible velocity, much more than a Geiger counter. That means that really in ourselves intelligence is really incarnated because we are using matter at its tiniest grain so that we can really put some order in the universe that is the property of reason. I know I have been very, very speculative; all what I have told you you can find it in every book; it is correct. It is not invention. You can believe it. But how can we figure out and feel that it is true. Well, I told you that having this little devil of Maxwell counting the particles, there is a molecule that must be released by one cell coming to the other cell. We call it the chemical mediator. And to see that more closely, let's come back to the eyes we started with. You will remember the iris; you remember the radial fibers; they are a special key, a special security key, a special chemical mediator that is adrenaline, and when you put

adrenaline on them, they contract and they open the pupilla. On the contrary, the muscle which is in the middle, the circular muscle, the orbicular muscle, is activated by the system by the cholinergic system, and if you put acetylcholine, it close. Now, if we read so easily on the eye what the person is thinking about us it is because we have a built-in system which at every moment follows the diameter of the papilla of the person we are talking with to see if it fits what we supposed person the person is thinking. Now, I'll explain that to you; it's very simple. When you propose a picture of a beautiful woman to naïve male, you give them two pictures which are absolutely identical, but in one of them you just enlarge a little with India ink or China ink, I don't know how you say that, the pupilla so that the pupilla is a little greater than in the other picture, and you ask the students, the male ones, "Who is the best? Where is she the prettiest? And all of them, without any mistake chose the picture in which the pupilla is a little increased, but if you ask them why this picture is better than the other, they don't know because unconsciously they have seen that the pupilla was greater. How can we explain that? I think women have long time ago been much more clever than the physiologist, but we physiologists are not that dull

because we call the nervous system which command the increase that is the contraction of the radial fibers, the adrenaline sensitive, that call is sympathetic; that is, the system which feels with sympathy, and if you have sympathy to some person, you look at that person and you have your adrenergic system, which is very stimulated, and you increase a little the size of your pupilla in a perfectly unconscious manner but in a manner which others see. Look at those nice students in medicine. You show them two pictures and they find the woman is more beautiful if they suppose unconsciously that she is looking at them with sympathy. When I told you that woman had probably understood that long before we had the explanation by physiology, it is because they were using in Egypt some trick to be more attractive. They were grinding the ashes of a given plant and they were using it to paint around the eyes. They still do it. Not only in Egypt now. And the research was exceedingly interesting because you cannot make sweet eyes, love eyes at your will. It has to be true. Otherwise, you cannot increase the size of your pupilla willingly; it has to be overwhelming. And they discovered that if they had put that makeup some drop of it was going in the conjunctiva, and it was poisoning the orbicular muscle, the one which close the papilla so that

if you have this poison of the eye, your muscle is paralyzed to close it but not paralyzed to enlarge it so it looks like the pupil is enlarged by admiration but it is only by toxicity. But you know what the name of that plant which produce that marvelous alkaloid? The name is belladonna. And it has been marvelously invented because the poor naïve male, when he looks at this person who has increased pupilla, he is obliged to suppose it is because she has sympathy for him, and he find our bella is donna. But the painters knew that long time before. You have probably remarked that in most, not now but previously, in most of the religious painting, the head of the venerated person was circled by a halo. Why? For a very physiological reason; that if you look with great interest, with devotion to a visage, you will increase the size of your pupilla. Too much light will come into the eye is an increased size of your pupil. Too much light will come inside of your eye, and you will have a halo around the head so that you see really the halo and love really dazzled. That's the reason why painters invented the halo along the holy person. Even a mathematician can notice that. If you want to see how a person is thinking, you can use a very dull trick just making multiplication. The person is not to have a strong light in the eyes but rather

diffused light so that moving the eyes will not change very much the light which come in the eye, and you will say "Multiply something difficult," with a lot of nine and seven, you know, those numbers that are difficult, and when the person will say "7 by 9" and is thinking about what could be that result, you will see that the pupilla will contract at this time, and when she remembers, and I will add what she had in her memory, at the moment she said "I will add," then you will she is opening the eyelid because the muscle of Moebius is also sympathetic, the one which help to increase the opening of the eye, and she increase the pupilla because the sympathy is also the memory, and if you want to feel in sympathy with somebody, it has to rely also on the memory you had, and even during the dullest possible occupation of counting aloud a multiplication, you will see that person is coming from the cholinergic to the adrenergic system, and you follow all the step of the thought just by the change in the pupilla. The eyes are, truly speaking, the mirror of the soul. That is terribly true when we are dealing not with healthy persons or with lovers, which are the all-seers of the mankind, but when we are dealing with disabled person who is mentally retarded, and we would see that the speed with which their pupilla react is not correct. You will see, for example, in Down's

children that their cholinergic system is very poor; that they cannot contract their pupilla very strongly when it is necessary, and it gives some floppiness to the outlook they have which is so typical that if you notice that you make the diagnosis just on the eye, even not on the eyelids and the epicanthus. That leads us to the notion that there are an enormous number of poisons of difficulties of our chemistry which could impair the functioning of the intelligence in its utmost and its highest function and to see those misfortune of the intelligence. And curiously, here we could summarize the whole pathology by taking comparison between machine and brain. Sometimes something is compressing the brain, the hydraulic pressure of a hydrocephalus for example. Sometimes there is a neuralgia that has destroyed part of the brain, and it is exactly like if you had burned part of your computer, the performance would fall down. The other possibility is that there is not a big mistake in the hardware but there is something wrong in the functioning. For example, take the best of the mathematician, a man able to extract a square root with a pencil and paper. There are still some people alive who can do that. Now, have it at the table and he do that to perfection. Now, give him two glasses of wine and look at the result. The result is wrong. But let him for

two or three hours and do it again without using anymore wine and it works again. Then only with acetic alcohol you have diminished the performance of the brain. We know why, but it will be too long to explain that. But in many different diseases which are not so temporary as the well being given by the wine, the continuous toxic is present or some of the matter that we use to build those security key I was talking about is not in an amount enough so that we can do the right amount at the right moment at the right place. And finally what you have is mental retardation. And to fight against that, curiously, the human brain is doing exactly the same thing as the policeman. If there are too many cars coming inside the highway, the highway cannot handle more than a given number of cars per minute. So, if you have an input that is greater than that, the highway gets stuck and there is no help for that. The only possibility is to reduce some of the entries. It's what does the people in charge of the control of the circulation. They block some of the entries so that the flow can still run. Now, we do the same, and you will recognize that there is something that does not go fast enough inside the brain for the very simple phenomenon that the person keep the mouth open, the tongue outside and maybe a little saliva going out. But the thing that is so

typical of the feeble-minded, it is exactly what we do. When you use all your intellectual power to admire the marvelous things, you are just like that, and if an artist is drawing with the most delicate point or line, he is having the tongue between the teeth and sometimes he has some saliva going out. That means that even normal people cannot do many things at the same time and they have to close some of the entries of the highway and just think about closing the mouth, which is a voluntary phenomenon. I have to look at that as being more important than keeping my mouth closed. So that when we are dealing with mentally retarded persons, it is no good tell them "shut your mouth;" they would do it because they are very kind people, but they will only think that they have to close their mouth and I would prefer that they think about what is going on around than just thinking that they have to close their mouth. In fact, we come to the feeling that what makes the depth of the reflection is the possibility we have to make, so to speak, a promenade in this enormous track which is inside our brain case and being able to visit some specialist. One is a linguist; one is a painter; the other a musician; the other is a sociologist; the other is a rationalist, and we are like a kind of monarch who has a kind of counselors around him, and if we

are healthy, we listen to that counselor and we tell him "Shut down," and we listen to the other one, and we are just behaving as a normal king should do when he has intelligent counselors. But if one of them is speaking all the time, if one of them refuse to answer, then you have all the typical diseases of the mind, all that we will classify in psychiatry. Well, nevertheless, even when we are in good health and having your intelligence working very well, there is still something that I touched upon yesterday that is a basic filler of our nature. We have difficulty to speak inside ourselves between our feeling and our reasoning; between the heart and the reason. And that is so typical that there is only one way we can go out of the difficulty which is sometime to have a kind of state of grace in which you can together feel and understand. Some people call it meditation; others call it prayer. We know that if we don't use that particularity of our intelligence, we are not intelligent at all.