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The Eyries and Pyres of Thought

High Schooler's Guide to Philosophy and Science

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The Eyries and Pyres of Thought

An R. N. Podar School--TED-Ed Club's presentation

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Philosophy — The Essentials

By Aditya Dwarkesh

The safest general characterization of the European philosophical tradition is that it consists of a series of footnotes to Plato.

-Alfred North Whitehead

The existence of the nothingness ceased with the opening of the cosmic eye.

For aeons beyond count was the Universe stilled with nothing but a swarm of countless physical interactions, cold, lightless, lifeless, an abyss, an austere beauty. The infinitesimal-sized masters of the Universe collided, absorbed, emitted; they destroyed and created, were destroyed and created.

Spied upon by none, events with the greatest degree of beauty took place; thence were born stars, nebulae, planets, black holes; colors mingling in manners beyond comprehension chased each other lightly all across the so very starry and yet so very empty sky of spacetime.

And then a strange, silent explosion took place; an explosion from the tatters of which rose a shuddering ghoul howling for life.

Stardust began perceiving stardust in an inexpressible manner. The cosmic eye obtained a mirror, a mirror by which it could reflect, by which it could observe and see itself. The cosmic witnessed its own self! Everything changed-and thus arose we.

We have travelled far since then, and today, we shall trace that journey. Today, we shall scrutinize not philosophy but philosophers themselves.

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To question the beginning of philosophy is to question the beginning of thought. This is an equivalency that was made clearer in my previous article. Alan Turing's iconic question "Can machines think?" may be rephrased to "Can machines philosophize?" with no violence.

The first philosopher would, then, in the truest sense of the word, be nothing but a mere ape wondering at the beauty of the stars as he gazed on-perhaps even the earlier and more primal fishes and reptiles, if you are willing allow to them a certain degree of intelligent thought and sentience.

And so philosophy began, more than anything else, as a way of life. It began as a set of principles which dictated how one ought to live one's life. Back then, it was passed on purely by word of mouth, from parent to son, from teacher to student. There was no wondering about abstract principles and metaphysical quandaries. The farthest concrete reports of such traditions date back to those so very esoteric schools of the East.

Modern philosophizing began in earnest with the coming of Socrates. A man whose word was powerful enough to have him remembered nearly three millennia later, Socrates woke humanity from its thoughtless slumber, opened its eyes to the awesome prowess of logical thought and rationality. His dialectic method of inquiry, now called the Socratic method, predecessor to, in fact, the scientific method, is an illustration of the epitome of fair and just reasoning. A method that Plato commonly described in action in his various texts, it consisted of questioning not the conclusions one reached; its heart lay in exposing the deepest and most implicit assumptions taken in reaching the conclusion, and then leading these assumptions on to contradiction after contradiction.

His ceaseless questioning and careless voicing of his opinion got him into inevitable trouble with the political leaders at the time, due to his antagonistic nature towards the government. Legend has it that, when called to court and given the opportunity to decide his own punishment, Socrates responded by demanding a free meal for having wasted his time. He ended up with a death sentence on his head for his trouble.

Socrates died for the truth. He died for what he thought was right. He declined the multiple chances he was given of escape. By dying, Socrates showed the world that he philosophized not for personal gain but for truth.

Such righteousness affected his student, Plato, deeply; he took the torch from Socrates seamlessly.

Called so because of his wrestling prowess ('Plato' means 'broad-shouldered one'), literature met philosophy for the first time with him. He both began and effectively ended the branch of philosophy called politics with his masterpiece, 'The Republic.'

Plato's student Aristotle marked the end of a great trinity. Aristotle was the first scientist of Earth. The size and scale of the data he collected and examined is unparalleled-a feat nobody can ever hope to match. His mistakes were many, but as Voltaire once remarked, "It is the privilege of the real genius, especially one who opens up a new path, to make great mistakes with impunity."

"Socrates and Plato, carrying the torch of human knowledge"

After Aristotle lay a period of relative darkness as far as the collective philosophical pursuits of humanity was concerned. It was Francis Bacon who came with the light, in the 14th century. He first laid out concrete proposals on how to conduct scientific investigations, and is as much the father of the scientific method as Socrates was. He explicated on the manner in which to observe nature and reason in order to arrive at scientifically valid conclusions.

The natural sciences began flourishing after him. Galileo Galilei began physics as we know it; Isaac Newton revolutionized the science. This branch of philosophy became more and more

well-defined-back then, scientists were philosophers-and soon enough, it cut off entirely from its father and became something in its own right.

However, our search for reality seemed to not have come very far. Bishop Berkeley brilliantly refuted the existence of matter itself.

It was Immanuel Kant who, in the 18th century, gave proper categories to the topic of all such conversations. He differentiated between objective knowledge and subjective knowledge, between logical truths and experientially known truths. A cleansing of knowledge of this magnitude had been seen only once previously, with none other than Socrates.

"Immanuel Kant, the sage of Königsberg"

One of the most important streams of post-Kantian thought flowed into the ocean now known as analytic philosophy, which in turn gave birth to an increased concern of language. Bertrand Russell and his protégé, Ludwig Wittgenstein, each concerned themselves with analytic philosophy and language respectively. Wittgenstein sought to demolish all philosophical problems as nothing but disagreements in language.

In the meantime, the tradition of existentialism began with Jean-Paul Sartre at its head, in an attempt to turn philosophy away from impractical metaphysical questions and back into a study of how to live one's life in the right manner.

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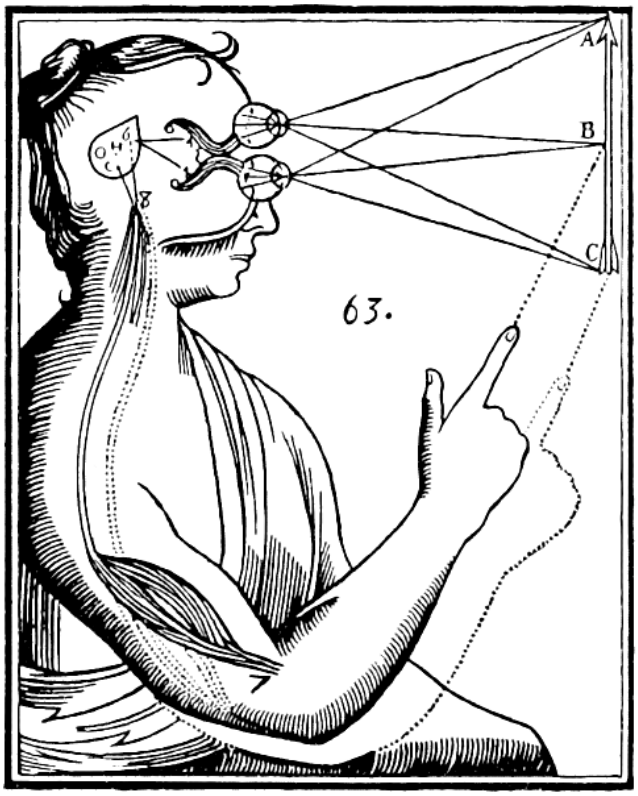
Right through your Cranium

By Kiranbaskar Velmurugan

INTRODUCTION TO DIFFERENT VIEWS ON MIND AND BODY

It started as early as the days of Plato and Aristotle. This is when proper theories of the soul and the body started to emerge. By now, even non-philosophers have strong beliefs and views on this topic. Many a times this problem was simply thought as trivial or obvious and not given further thought. But now that it has been – and is still being – analyzed deeply, many people have realized that not only is this topic difficult to resolve but also that it is connected to various other subjects and questions of the like.



René Descartes's illustration of dualism. Inputs are passed on by the sensory organs to the epiphysis in the brain and from there to the immaterial spirit.
[Drawing from René Descartes' (1596-1650) in "Treatise of Man" explaining the function of the pineal gland.]

Perhaps the most prevalent view on the mind and body right now is Cartesian dualism. A school of thought founded by René Descartes, this theory simply states that mental phenomena are distinct from the materialistic body. It is quite easy to see how this view is present everywhere. Just pick a religion. Almost all religions are in accordance with dualism, from Christianity to Hinduism. Probably the only famous non-dualistic religion is Buddhism. The best way to summarise this theory would be by the following two points:

1. The mind is different from matter.

2. Although it is different, it can still influence matter.

It is the second point that has been debated for centuries. Although Descartes tells us that the mind influences matter, the question remains as to how this happens. Descartes believed that the mind controlled the body through the pineal gland, an important gland in the brain that regulates vital activities. This was a bold statement coming from Descartes because in that era, there were no conclusive models on the brain that has empirical support. Clearly, very few people believed in this theory, but Descartes's dualism still lived. Almost everyone agrees with dualism, they speculate and make claims with dualism as a premise often, even without noticing or intending to. Dualism has become so prevalent that it has even integrated with language. Consider the following sentences:

1. With what he earns, he can barely manage to keep his body and soul together.

2. She dedicated herself to her research, body and soul.

Note how sentence (1) suggests a separation of the body and the soul on failure of survival. Similarly, in sentence (2) you'll see how the phrase "body and soul" is used to refer to the person as a complete being. Such silent references are probably also found in other languages as well.

This topic of which dualism is a proposed solution of is often called the "Mind-body problem". I highlighted Descartes's theory because it was at this point that all the previous views on dualism, from philosophers like Aristotle to religions, culminated and were regarded as one school of thought: "dualism". This is when other schools of thought started to emerge and many philosophers started challenging the 2nd point of the summary of dualism given above. It will be better if I define a few terms that will be frequently used throughout this course to make sure discussions remain clear.

Body: The physical structure of a person, consisting of flesh, bones and tissues. This includes your Brain.

Brain: The part of the body that takes in information from outside and gives out neural impulses.

Mind: The mental experiences and the culmination of the very person. Also referred to as the person's "soul" or "essence".

These definitions are not the standard, but it is what I will be referring to whenever I use the words.

Although there's many different views on why dualism as a theory fits and doesn't fit I won't be going to each one of them over here. Although the majority of the population may be dualists, you'll rarely find any if you look at philosophers and scientists. Many such people believe in the

opposite, that there is no real distinction between the mind and the body. This is usually explained by showing how either one of them or both of them emerged out of one common thing. When you say everything can be traced back to one underlying layer, you refer to a theory called monism.

There are many other thoughts on the problem. Many people like Immanuel Kant, Alfred North Whitehead, Karl Popper, etc. have had their own views on this problem. Each of their views can be expanded into their own books, and for that reason I shall not go into detail into the different types. I will expand into the types of monism later.

So far I have traced back the history of the mind-body problem and introduced the theories of dualism and monism. These two theories have been at war over the last century and I'd like to elaborate on them in the next article.

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Koan-tum Mechanics

By Ameya Kunder

At the heart of quantum mechanics is a rule that sometimes governs politicians or CEOs - as long as no one is watching, anything goes.

— Lawrence M. Krauss

If I would ask you to mix 10ml of Hydrochloric Acid (HCl) with 10ml of Sodium Chloride (NaOH), you would very well do it by taking these two fluids in two different test tubes in the appropriate proportion and mixing them. It would be frivolous for you to even think about the reaction getting altered in any sort by your observation. Measurements and observations made on the classical level don't seem like an issue to us. We weigh the grocery products that we buy, determine our heights and make several other forms of measurement.

If I asked you to flip a coin and measure the outcome, you could easily tell me if it were heads or tails. It would be logically unsound to say that the very moment you try to measure the state of the coin (the only two possible states in this case being heads and tails), it would flip on its own and give you a different outcome to what it was when it landed in your palm. Such inane fictitious assumptions only make sense when we zoom into the quantum level.

THE DETECTIVE

Returning to the experiment we discussed in the last segment, we were faced by the question whether an electron really was a wave or a particle. Let's break down this question and investigate a bit further. As the electrons produced a wave interference pattern, we concluded that it had characteristics which were similar to that of a wave and since it even produced dots on the screen we concluded that it had particulate properties. If it were a wave, it would've gone through both the slits, else, just one of them. To verify this we can fit a detector in front of one of the slits to detect which slit the electron really passed through when it was fired. This would determine if the electron behaved like a particle.

So now we redo the entire experiment, but with a detector which can detect the passage of electrons through one of the slits. We wait for the apparatus to function for a while so that we can see a projected pattern on the screen. But to our amazement, now the electrons behave precisely like the tennis balls in our very first experiment – they form two separate dark bands instead of a wave interference pattern. Did the involvement of detectors in the experiment just change the entire outcome of it? And if so, why and how? Is the electron in some sense aware of the placement of the detectors and is hence functioning in a different manner?

Assuming that the detector somehow disrupted the path of the electron, we now place the detector behind one of the slits, so that the electron first passes through the slit/s, and then gets

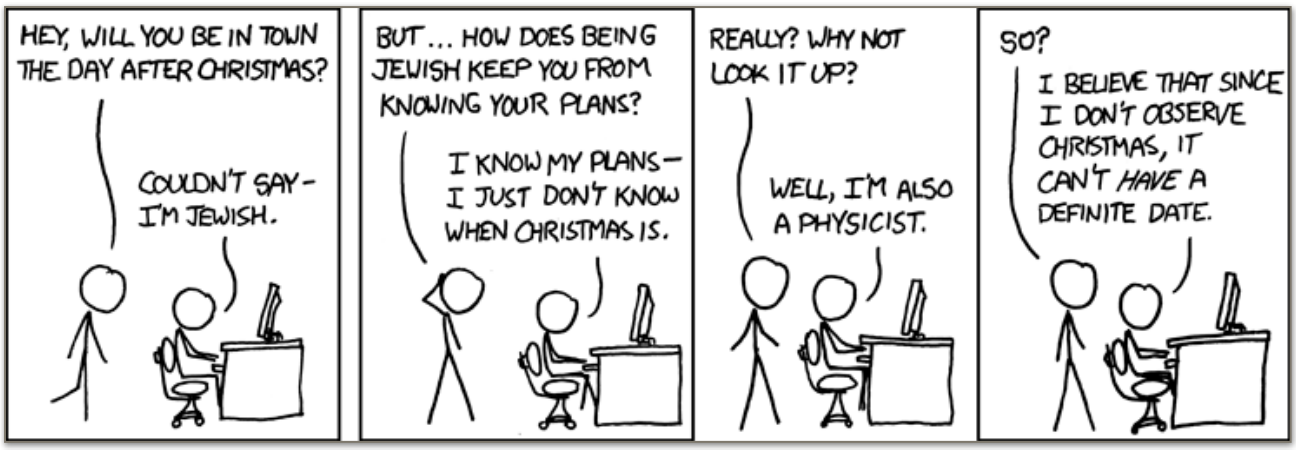
detected. So we redo the experiment and patiently wait for the results. But again the experiment ends in the same result- two dark bands are observed on the screen.

Let's assume that when we placed the detector behind one of the slits, the electron was unaware of its presence and passed through both the slits at the same time. But as it paced forward on its trail, it encountered the detector. Did the electron behave like a wave and then as soon as it got aware of the existence of the detector somehow traced its path back and behaved like a particle? Did the electron really travel back in time to change its state? Or was the electron already alert to the presence of the detector?

Wave-particle ambigram by Douglas Hofstadter

This problem of observation was rightly summed up by Marcus du Sautoy in his book 'The Great Unknown'- "If, years later, I do use the slit detector to observe which way the electron went, it will mean that many years earlier the electron must have passed through one slit or the other. But if I don't use the "slit detector," then the electron must have passed through both slits. This is, of course, extremely weird. My actions at the beginning of the twenty-first century can change what happened thousands of years ago when the electron began its journey. It seems that just as there are multiple futures, there are also multiple pasts, and my acts of observation in the present can decide what happened in the past. As much as it challenges any hope of ever really knowing the future, quantum physics asks whether I can ever really know the past."

"You see, but you do not observe", was what Sherlock Holmes once said to Watson. It was his expertise in inspection and scrutiny that made him solve the most baffling and mysterious of the criminal cases. But here, it's the observation that makes the situation all the more mysterious.



Source: XKCD

KOAN-CAVE

If the outcomes of this experiment have not bewildered you enough, here's another koan for you!

Huike, the Second Patriarch, said to Bodhidharma, "My mind is not yet at rest. Master, I implore you, set my mind to rest."
The master replied, "Bring your mind here and I'll set it to rest for you." Huike said, "I've searched for my mind, but am unable to find it." "Here," said the master, "I've set your mind to rest."

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Relatively Simple

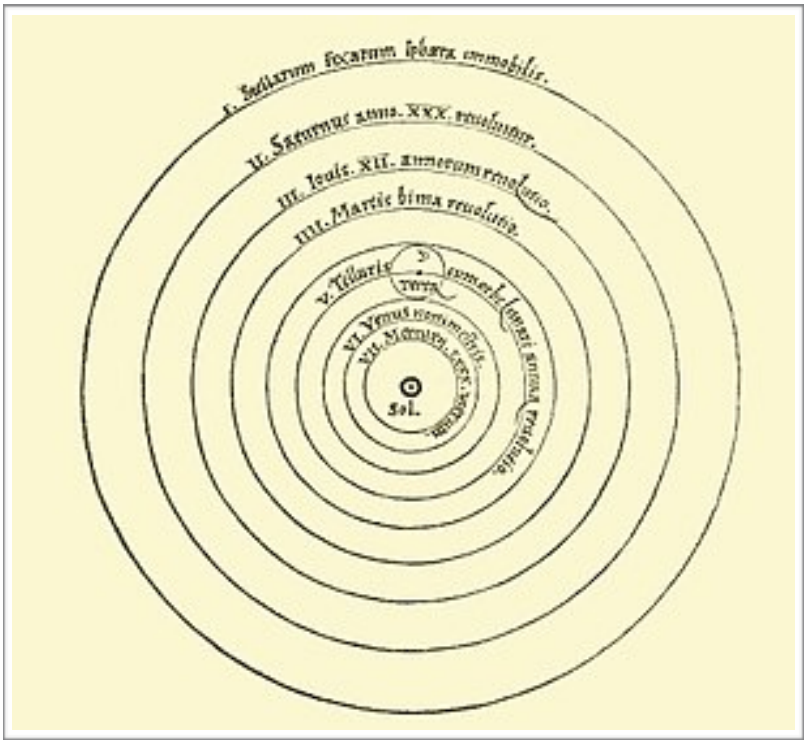
By Pulkit Malhotra

Often it is only after immense intellectual effort, which may have continued over centuries, that humanity at last succeeds in achieving knowledge of a concept in its pure form, in stripping of the irrelevant accretions which will it from the eyes of the mind

- Gottlob Frege

The theory of Relativity came to be because of calendars.

In the 16th century, due to the wide inaccuracies in the Julian Calendar, there was a strong need for reform and thus increased the Church's interest in the field of astronomy. In 1543, Nicolaus Copernicus, a mathematician, and astronomer published his *magnum opus*, *De revolutionibus orbium coelestium* (On the Revolutions of the Heavenly Spheres). He dedicated this text to the Pope Paul III thinking that if his theories were right, it would lead to the development of calendar far superior to any other present that time. In the book, he put forth the idea of a heliocentric (Sun at the Center) world, which contradicted the Bible, according to which the earth was at the center of the universe and the stars and planets revolved around it. As expected, This didn't sit well with The Church and led to a wide rejection of his theory. It is said that it was on his deathbed that he received the printing proofs of his manuscript. He is said to wake up from a long coma, look at the scripts and died peacefully.



Copernicus's vision of the universe in De revolutionibus orbium coelestium

GALILEAN RELATIVITY

'It is the duty of an astronomer to compose the history of the celestial motions through careful and expert study. Then he must conceive and devise the causes of these motions or hypotheses about them. Since he cannot in any way attain to the true causes, he will adopt whatever suppositions enable the motions to be computed correctly'

- Andreas Osiander

Galileo Galilei Demonstrating His New Astronomical Theories at The University Of Padua Painting by Felix Parra

After almost a century after Copernicus's death, the "father of modern physics", Galileo Galilei published his magnum opus, 'Dialogue Concerning the Two Chief World Systems', which seconded the idea of Copernican heliocentrism. The biggest argument that most theologians of that time had was that if the earth was rotating at thousands of miles per second, then a ball straight down must fall at the west of the building as the earth would have moved east. To counter this view, Galileo proposed the following thought experiment :

"Shut yourself up with some friend in the main cabin below decks on some large ship, and have with you there some flies, butterflies, and other small flying animals. Have a large bowl of water with some fish in it; hang up a bottle that empties drop by drop into a wide vessel beneath it. With the ship standing still, observe carefully how the little animals fly with equal speed to all sides of the cabin. The fish swim indifferently in all directions; the drops fall into the vessel beneath; and, in throwing something to your friend, you need throw it no more strongly in one direction than another, the distances being equal; jumping with your feet together, you pass equal spaces in every direction. When you have observed all these things carefully (though doubtless

when the ship is standing still everything must happen in this way), have the ship proceed with any speed you like, so long as the motion is uniform and not fluctuating this way and that. You will discover not the least change in all the effects named, nor could you tell from any of them whether the ship was moving or standing still. In jumping, you will pass on the floor the same spaces as before, nor will you make larger jumps toward the stern than toward the prow even though the ship is moving quite rapidly, despite the fact that during the time that you are in the air the floor under you will be going in a direction opposite to your jump. In throwing something to your companion, you will need no more force to get it to him whether he is in the direction of the bow or the stern, with yourself situated opposite. The droplets will fall as before into the vessel beneath without dropping toward the stern, although while the drops are in the air the ship runs many spans. The fish in their water will swim toward the front of their bowl with no more effort than toward the back, and will go with equal ease to bait placed anywhere around the edges of the bowl. Finally the butterflies and flies will continue their flights indifferently toward every side, nor will it ever happen that they are concentrated toward the stern, as if tired out from keeping up with the course of the ship, from which they will have been separated during long intervals by keeping themselves in the air. And if smoke is made by burning some incense, it will be seen going up in the form of a little cloud, remaining still and moving no more toward one side than the other. The cause of all these correspondences of effects is the fact that the ship's motion is common to all the things contained in it, and to the air also. That is why I said you should be below decks; for if this took place above in the open air, which would not follow the course of the ship, more or less noticeable differences would be seen in some of the effects noted."

As expected this again received a severe backlash from the Church for this and unlike Copernicus, Galileo was an outspoken and harsh critic of the Church and their 'barbaric' theories, which later caused Galileo to be condemned by the Catholic Church for "vehement suspicion of heresy".

The Church further set up an Inquisitorial commission to look into the matter.
In February 1616, the commission concluded that heliocentrism was "foolish and absurd in philosophy, and formally heretical since it explicitly contradicts in many places the sense of Holy Scripture." The Inquisition found that the idea that the Earth moves "receive the same judgment in philosophy and... in regard to theological truth it is at least erroneous in faith". Pope Paul V then instructed a cardinal to deliver his finding to Galileo and to order him to abandon the opinion that heliocentrism was physically true. On 26 February, Galileo was called to the cardinal's residence and ordered:

... to abandon completely... the opinion that the sun stands still at the center of the world and the earth moves, and henceforth not to hold, teach, or defend it in any way whatever, either orally or in writing.

This result further led to the banning Copernicus's De Revolutionibus and other heliocentric works until they are 'corrected'

Galileo facing the Roman Inquisition by Cristiano Banti (1857)

For centuries, the heliocentric approach was stopped mainly due to the involvement of the church as many people didn't want to share the faith of Galileo.

For more than half a century after this, no significant progress was made in the field. Then came the apple of a physicist's eye, Isaac Newton. Inspired by Galileo's work, he reignited the spark for the relativity theory and put forth the foundational stone of a theory of gravitation.

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