

Socrates, Atoms & Being: A Dialogue
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Abstract

Socrates, Theaetetus & Polydorus gather in the the house of Theaetetus to discuss the meaning of atoms, being and what is understood by the word fundamental.

Biography

Has studied mathematics at Oxford and Physics at Imperial College London. Worked as a software engineer in finance. Currently an independent researcher in the philosophy and history of physics.

Scene 1 – The Agora, Athens

Polydemus: Socrates, I learnt of a most remarkable notion today and I hurried over to the agora thinking that I would find you here to tell you all about it and ask your own opinion of this.

Socrates: It must have been a most remarkable speaker, I do not think I have seen you so excited before. But come, I was on my way to the house of Theatatus the geometer. We will speak there of it. It is always better to speak in company and in a house where one is sure of a good welcome.

Polydemus: Theatatus is a good man and well-known. I saw him last at the Panathenea where he was first amongst those to pour out the libation to the goddess.

Socrates: A daimon must have whispered in his ear. He is generally a man that shuns the public festivals.

Polydemus: I have need of my own daimon so I can be assured of good advice. I have asked for advice amongst my friends and I find that I am first persuaded by one man of one opinion and then by another man of an opposing opinion until I end up bewildered and no longer know which way to turn.

Socrates: Not knowing is the beginning of wisdom though it often feels like the loss of the ground one is standing upon, the sky one is standing underneath and having been pitched into the full and tossing sea.

Polydemus: By Zeus, you speak like a man who knows.

Socrates: If there is one thing I have learnt in my long life is that knowing that one doesn't know is a kind of knowledge. No doubt a man will come who will turn this into a method and a foundation but method I find a chore. It is better to talk amongst friends and sometimes amongst enemies ... Here is the house of Theaetetus and I see he is amongst friends.

Scene 2 – The courtyard in the house of Theaetetus

Theaetetus: Greetings Socrates. We have just been talking about you.

Socrates: My name it seems travels even when I stand still, is this not wondrous? Polydemus is with me, he found me at the Agora eager with news of some happy thought.

Theaetetus: Greetings, Polydemus. How is your father?

Polydemus: They are well and sing of your praises.

Theaetetus: We have need of some song. This is Eudoxus and Sobius. What is this news that you have? Are Zeno and Parmenides in Athens? I have heard that they would be here for the Panathenea but I did not see them there.

Polydemus: I have no news of them, but I have news of a greater men than Parmenides. Leucippus and Democritus. They explained to me the most amazing notion. I did not know what to make of this. They had me sat down all this afternoon. First one speaking and then the other. They spoke in tongues and it seemed as though a god had taken hold of them and lifted them to the clouds. A shadow lifted from my mind. There can be no better men. They have founded a most marvellous new world where none was before.

Theaetetus: Come, come. Are they poets that they speak in tongues? My brother is a poet and I understand him not. Music, I say is better by far. It has no tongue yet all men understand it. In this, it has many tongues.

Polydemus: Is Parmenides not a poet? And has he not taught us that the Being is changeless, still and without motion and this with many proofs?

Theaetetus: He has, though he gives it the appearance of a vision.

Polydemus: They say, whence comes change? For change is all around us. To speak of changelessness seems absurd for, as Heraclitus has said, all things go and nothing stays and we cannot step into the same river twice. It is a constant in all our lives and in the heavens too. Do we not see the sun set and the moon hide her face? They ask, is not change fundamental in the world? They say, how does Parmenides explain this? Yet they admit the strength of his proofs and say also they have mightily struggled over this. They say, that everything is a myriad of atoms, they rush apart in the void and join together with hooks. They are minute and not visible to the eye. Had we eyes strong enough we would see them. They are like the motes of dust dancing in a sunbeam. They make shapes, solidify into wholes and then collapse again into their parts. With this they explain the world and change. Is this not most marvellous Socrates?

Socrates: I marvel at the invention of men. And there is much to marvel over here. What are the shapes of these atoms?

Polydemus: They are well rounded like the sphere. Each one identical to the other.

Socrates: And yet they have hooks?

Polydemus: You must speak to Democritus - I do not now recall how he explained this.

Socrates: And these atoms, do they themselves fall apart? Are they themselves made of atoms?

Polydemus: They are eternal and permanent. There is nothing more real. They were there at the beginning of time and will be there at its end. They are everlasting. They are at the root of all things. Say you take a piece of wood, and then break it in half. Is not each part a piece of wood?

Socrates: Of course.

Polydemus: And if you take a half again, and break that again is that not again a piece of wood?

Socrates: I can see where you are driving me to with this. Yet say, I took a cup and broke that in half. Is not each half different?

Polydemus: Yes. I cannot disagree with that. You must keep dividing and not stop. If you keep dividing the cup what makes it a cup disappears and you have small pieces which look alike. And surely we cannot keep dividing until they vanish. What remains is the atom or rather atoms.

Socrates: How wonderful. Are they all alike?

Polydemus: On this they differ. Leucippus says not and Democritus says they do. They say that an atom is an element of being that cannot be further reduced. They are at the root of being, supporting it.

Socrates: I take my cup and place it on a table. The table supports the cup. After all, where would the cup be if there was no place for it. What would support it? Would you say that both the cup and the table have being?

Polydemus: I do not see how it can be otherwise.

Socrates: Then the void of Leucippus and Democritus. Does this have being?

Polydemus: I think it must not, for there is nothing there. Yet were it truly not to have nothing there then how could we put something there. It is like a empty jug, which even when empty contains a space, a place for water; and so, perhaps, yes. But it is a strange kind of being, a very thin kind of being, not like the being of wood which you can knock up against or bang a nail in. Ah, yes, I have it now! If one can bang a nail into wood and also pour water into a jug then they are alike in this; and if the first has being then surely the latter has .

Socrates: Then are we not back again where Parmenides left us? Being in being is just again being.

Polydemus: You have me. But I do not think you would stop Democritus and Leucippus so easily.

Socrates: Let me summarise: they seem to have broken apart Parmenides whole and well-rounded being into many parts and each one a tiny reflection of that first being. They have multiplied his being into beings and then joined them up again.

Polydemus: I had not seen it this way. Yet, it seems that you are right. Socrates, you have a most marvellous facility for seeing things afresh.

Socrates: So they say each atom is a one, distinct in itself, eternal and well-rounded. And all identical.

Polydemus: In short, yes.

Socrates: Well, say that I throw two of these atoms together do they collide or do they constantly approach each other without ever colliding?

Polydemus: What strange questions you are asking Socrates. They must collide, I cannot see otherwise.

Socrates: And if they touch are they, the two atoms, not become as one? For if they do not touch we can slip a leaf between them. Yet if they do touch and we cannot slip a leaf between them how can we say that they are distinct?

Polydemus: You have me again. I do not know.

Socrates: It seems to me that atoms, though a delightful invention, do not get at the root of being. Perhaps we must ask what it means to get at the root.

Polydemus: Have they not explained many things by one simple conception? Is that not getting at the root?

Socrates: Look at the root of a tree, for although we speak of it as one the roots of a tree are many and spread out in the earth. We must delve deep to find roots. Now, I have heard it said that all the ancient thinkers agreed that contraries were at the root of being. So if we admit parts we must admit wholes. Are not your atoms conceived in such a way as to make wholes? Is then the whole not prior to the part? Yet, the way you have explained it demonstrates the parts come first.

Polydemus: I understand what you are saying Socrates yet it seems to me that the part must come first. If I make a table I must have the parts at hand and a hammer to make my table.

Socrates: And I too understand what you are saying and if I were to make a table I would be sure to have some carpenter deliver me the wood and the hammer before I began on my table. It would not do to go about the courtyard looking as though I was hammering together a table and yet there was neither wood there or a hammer in my hand. People would say that Socrates has gone mad at last. I think some say this already. Yet, my dear friend Polydemus must I not have an idea in mind of the table I am going to make before going to make it?

Polydemus: Yes, but you are a man and not wide-earthed nature. As a man you must have an idea in mind. What would a man be without an idea? He would not be a man. A man works with purpose even when he is at leisure for then leisure is his purpose. And where are these ideas in nature? We do not stumble over them in either the day or the night. This is too dark for me! What happens if we set two ideas colliding together? You see, Socrates, I too can ask questions!

Socrates: Well done, Polydemus. You have stilled my tongue and I am stopped.

Theaetetus: If you are stopped Socrates then perhaps I can now speak. Let us enter the cool shade of my rooms. I see the sun is hot overhead and poor Socrates and Eudoxus who have said nothing and

merely watch, listen and learn are both tired and sweaty to judge by their faces. Let me call for refreshments.

Scene 3 – In the living quarters in the house of Theaetetus

Theaetetus: Socrates, what is fundamental is wine when one is thirsty! What do you say to that?

Socrates: I say I drink to your health and to your thirst!

Theaetetus: Now what comes first, prior to all other things, is what makes everything else possible. What is at the root of nature is order. It cannot be otherwise. First, can we conceive what is the lack of order? We see disorderly men at a disorderly table drinking and speaking at odds. Yet, even in this disorder there is order. That cup of wine he holds in his hand is still a cup and not some other thing, it holds its shape, it retains its order. And that man's speech, disjointed and disorderly though it is, each word is a word of Greek. If the all wholly lacked order there would be nothing. But a strange kind of nothing since it is not actually nothing - as Parmenides taught us - what is not, is not. It is a something. Perhaps it is the primordial chaos that Hesiod wrote about in his genealogy of all the gods and that came before all the gods. Yet order cannot come out of nothing. Order comes out of order. Laws beget other laws. They are the sons and the daughters of the law. It is that first law we seek. Or perhaps a great chain of laws to reflect the great change of being and beings.

Polydemus: You are speaking of the laws of nature?

Theaetetus: In a manner of speaking - yes. If I pick up this stone and drop it do you not see that it moves in a straight line directly towards the earth?

Polydemus: It is not just this stone but every stone. And you are right, it is a straight line. I have seen this every day yet I had not noticed until you pointed this out, that it must be a perfectly straight line. For what force would make it move away from its natural motion towards the earth and which way would it choose? If it were to choose, then it would be by chance, and we would have to admit chance as a cause. This too Leucippus spoke of, they call it the clinamen. Atoms themselves move not in straight lines, but like the motes in a sunbeam - first this way, then that. But you are a geometer and geometers set things out in straight lines.

Theaetetus: You well understand me! Now, if I pick up this stone and drop it again, will it fall to the earth in the same time, or less, or more?

Polydemus: I think it should be the same. It could be less by an amount that we cannot see, given how fast it moves, and by the same, a little bit more. Yet, I think the simplest choice here is to say the same and we should choose the simplest if not forced otherwise by circumstance.

Theaetetus: And does not this law hold throughout the land? It is this that I call a law of nature. Nature is well-ordered and she keeps herself in order by laws. But mark you this, that I say laws in the plural, but the best law, the most perfect law must be one. For if we had many laws, there must be laws that keeps these in order and yet higher. And more - if there was a law that varied, taking one form here in Athens and another in Sparta we can expect that there is a law to explain this variation. The real, true law must be one, whole, unvarying - and well-rounded, being alike everywhere – and treating everything alike.

Polydemus: You too are a follower of Parmenides? I had taken you to be a follower of the Pythagorean lyre.

Theaetetus: That I am - the music of the sphere is all around us. I am haunted by it.

Socrates: You turn yourself into a poet. Do not your laws of nature take a mathematical shape? The stone falls in a straight line, and how long it takes to fall is a number - whatever that number may be. It seems here number and geometry has made itself incarnate in body.

Theaetetus: I marvel at this every day. But do not call me a poet for I do not understand poets.

Socrates: Then does not line and number precede your laws of nature? Are they not an idea before they are anything else? Where are your ideas? In your mind certainly, and where are the ideas of nature? In nature herself.

Theaetetus: This is a hard and difficult problem. For being cannot be two. For then we have a real void and not the false void of Democritus. How would influence travel through a void? To be where nothing is not? There must be a medium that allows it passage. It cannot be. Men have minds and men are a part of nature though they often set themselves against her, withdrawing into the cities. Yet I cannot see how a mind can be a body. It is found in bodies. And where there is a body there is a mind. You will find my mind - so to speak - in me. Yet to say that it has a place or a location seems at odds with its nature.

Socrates: An explanation of the all to justify the name of a true and fundamental explanation must account for both. To explain one is to only explain half the story. Though nature is far broader and wider than men. Are we to reduce mind to body or body to mind? If we cannot do the first reduction then we must try the other. Yet if body is reduced to mind is all of nature the nature of the mind?

Theaetetus: Socrates, you bewilder me. It seems hard to see what this means we seem first driven towards one and then to the other. I cannot see how the wood can be mind or have mind. Listen – does it speak?

Socrates: All things are full of gods and Nature herself is like a well-ordered city. All her parts are kept in order by some supreme law which enacts justice in all parts. Here freeing up, and there reprimanding.

Theaetetus: Now you have leapt ahead and my logic is limping far behind. I do not follow where you are leading with your winged words.

Socrates: You do not like poets yet you sometimes speak like a poet. We have agreed that your laws of nature are the form of geometry and number - perhaps both - for is not a unit of length a number? As is a unit of volume? And if both, then a unity. I say, Geometry and Number embrace each other and melt into a unity whose faces now show one and then the other like the Janus headed god, whose aspect surveys both past and future. Nature, in one of her aspects both geometrisises and individualises, making multiplicity out of unity.

Theaetetus: Nature is a geometer and she loves to geometrise.

Polydorus: You say that because you are a geometer and you see everything geometrically. I do not see geometry speaking but a geometer.

Socrates: Now a true law of nature must take account of all things. And freedom is fundamental. Do I not now choose to speak, and then to stop? Can I not lift up my hand, and then move it first to the right and then to the left? This is freedom, though it is bound by circumstance. All men are free though they find themselves in a city and bound by its laws - though they may choose to break them. And also in a world, and they cannot choose to break these laws. Men are not gods.

Nature herself partakes in freedom. Do we not see the clouds first take one form and then another? First the shape of a hill and then of a ship? Between the law of nature that says a stone falls in a straight line and the law of nature that says a man walks in freedom there must be a law that partakes of both, that encompasses both. The first is necessity and the second is freedom. What law can encompass both? Their natures seem to be at odds. Yet, the first philosophers have all agreed that the true elements of nature are contraries.

Theaetetus: Yet a stone falls towards the earth. I do not see stones falling towards the sky.

Socrates: Everything has its own nature. Does not smoke reach upward to the sky? There may yet be stones that fall towards the sky. The moon, it seems to me, is very much like a stone. As is the sun. A fiery stone, it first rises in the sky and then falls and does it hit the broad breasted earth?

Theaetetus: This would be very strange, would a new sun be born each day? The Egyptians say that Ra, the sun god on his golden boat dives deep into the underworld to arise on the other side. And Anaxagoras taking a leap says that the earth itself is well-rounded like a sphere, like the moon and the sun. Though, I say, if the sun and the moon move then why does the earth not? Are we as men standing on a moving ship who do not feel the movement though the ship itself moves upon the sea?

Socrates: These are excellent questions, but I wish to take a step back. Necessity and freedom. These shape our world and our own selves. Even the gods do not fight against necessity. Ananke who holds the spindle of time, and is mother of the fates, binds them. And laws dispense justice by necessity in nature and freedom in man, yet being a part of nature he is bound by necessity. Men are a mixture of freedom and necessity. It seems to me we need a way of speaking about both at the same time. Justice has this nature.

Theaetetus: So you take justice to have first spun the well rounded sphere?

Socrates: She is here with us. In the clouds, the leaves, the stones and within men. She is within the wine-drenched sea.

Theaetetus: Now you speak as a poet. And as I have already said I do not understand poets.

Socrates: I am far from a poet. Yet a wind of inspiration sometimes catches my tongue. Poets are in love with inspiration, they worship the muse. I only ask she speaks to me without flattery.

Theaetetus: Nature needs to be flattered to give up her secrets. In this she is very much like a woman. What is fundamental is woman. Man is born of woman and takes a woman for a wife or a mistress. Where would man be without woman? Where would woman be without man? The gods created not just things in the world to stand by themselves, here, now and in all eternity; but yokes to tie things and bind things together.

Socrates: Even the gods admit this. What is fundamental is the ground upon which we can build. A ground well-secured for we do not want our house to sink. And well-cleared, for the ground is to support a house and not a forest. A forest can grow on rough ground. The ground is beneath us, so we can stand upon it, so we can build upon it.

Yet, there must be a space for the house to be built up. So the fundamental is not just the ground, the bare earth upon which we build, but the place that the house itself will occupy.

Theaetetus: There is more to this fundamental than first meets the eye. This is always your way *Socrates*. It is fundamental to you! I will add, that a house of two stories has more than one ground. It has two.

Socrates: This is true, and wonderfully said, you fine upstanding man! There is more to myself than questions growing upon questions like figs upon a tree. I must eat and also bathe. Yet, were we to have the ground and the place we must admit that a house does not build itself.

Theaetetus: But a tree grows from a seed, it is its own maker.

Socrates: Again well-spoken. It has its own law of growth; for change admits of two distinctions, either something changes because something external to itself causes change, or something changes because of cause internal to itself. There can be no other. Except, of course, a mixture. But this we already admit. The first is like the house, and the second the tree.

Now every tree is alike, and every house is alike; and if one is alike to another, then there must be some common law that tempers them, that persuades them to grow alike. I say, some book of law is hidden deep within the seed that the seed consults to grow in accordance with the law of its growth.

Theaetetus: *Socrates*, what startling images you coin. Now, a master builder may consult a book to build a house, but what of the seed? I might grant you that a book of law may well be hidden within

the seed, for a seed is very small. But I say, Socrates, it must be a very small book to be so hidden and quite unlike ours which are bulky with many pages. But what of the tree? Is it within its roots, its branches or within the leaves?

Socrates: It must be spread through-out the tree, being somehow in all places all at once. Look at our books, our scribes makes copies so a man in Athens can read the same book as a man in Sparta. And is not a tree made up of many parts though it, itself, is a whole?

Theaetetus: So you judge that the fundamental law regulates, builds, tempers and persuades?

Socrates: There is more, a house is built of wood and a tree draws its nourishment from the ground. There must be some substance from which all the things of this world, all its shapes that are drawn from.

Theaetetus: So substance must be fundamental as is the law that shapes and forms it?

Socrates: I see no other way.

Theaetetus: Yet whilst the wood we build our houses does not change our own law changes. As do our houses. The houses built in our fathers fathers time is different from what is built now. Yet if the law changes, what law is this, can we even call it a law?

Socrates: Again, do we not go from a lower court to a higher court if the first opinion does not agree with us? A law can change in agreement with a higher law. We can call all this the law. The law is one but it also multiple admitting of many variations. When we look in a forest do we not see many types of trees, yet they are all alike in that they grow from seed aiming at the sky and drawing nourishment from the earth.

Theaetetus: And perhaps from the air itself, as we do; for their branches are very much alike as their roots. What is atop the trunk of the tree is very alike beneath it.

Socrates: Symmetry is a principle or law well-beloved by nature. The one half of your face is alike the other half.

Theaetetus: My wife says not since I fought in the Battle of the Thirty. Parmenides speaks of being as well-rounded, the sphere being the most rounded and most symmetrical of things. Is not the sun and the moon both alike in being well-rounded? And the orange in a tree? And a house, though badly rounded, being more alike to a cube is, is it not, if one looks at it from afar, very much a like a sphere? And is not the earth beneath us not well-rounded?

Socrates: If it be as Erasthenes says. The law is well-rounded for it treats all alike. This game of cosmology is a wondrous thing.

Socrates: You think the cosmos is a playground?

Theaetetus: Yes, for the gods. They play, and we are their playthings. Now, Socrates, let us take a piece of rope; I can bind it into many shapes - or I would if I were a sailor like Polydorus. Come Polydorus, how many ways of knotting a rope do you know?

Polydorus: I know many. Are you saying that the elements of this world is like a rope knotting itself?

Theaetetus: Or unravelling itself. What's is now, is; and it unravels itself into the past; and what is to come, unravels itself; The thread of time upon the loom of earth both knots and unknots. It seems to me that this is no stranger a notion than the atoms of your friend. It has the advantage that it explains its own varied shapes. Perhaps your atoms are as knots?

Polydorus: And I thought that Democritus had gotten to the bottom of things but you have out-bottomed him! There are more levels to this than one first thinks. This is indeed a knotty problem.

Socrates: And we must unravel it. One notion when looked at closely can appear to be the fruit of another. Notions grow on top of each.

Polydorus: Yet would you not agree Socrates that what is behind or beneath is more fundamental?

Socrates: It appears this to the eye. But the eye can deceive - was not Homer blind so that he could see the truth with an inner eye. We must develop our inner eye and not be fooled by our senses.

Theaetetus: Surely our senses do not deceive us. Is that not you Socrates in front of me, and Polydorus next to you?

Socrates: Yes, to both. Deception here, is not just the truth, for truths can be partial and being partial, many. But to relate the whole of the truth, which being whole is one. Though being one and well-rounded it must have many sides and those sides relate to each other. Do you not see the courtyard we stand in and the sun that makes all visible? Was not the truth you uttered partial?

Theaetetus: Yet I cannot speak the whole truth every time I am to speak. There would be no time and nor would my many friends be patient with me. Indeed, I would be scolded into silence.

Socrates: Parts make a whole. But what came first the whole or the part? We see the part but not the whole. The whole is not in front of us until every part has taken its place. Yet no part would be in its place if there was no notion of the whole for each part to take its place.

Theaetetus: Are notions like laws?

Socrates: They are alike.

Theaetetus: If the world was once a seed.

Polydorus: Or once an egg.

Theaetetus: A seed is very much like an egg. An egg for plants and trees. Whence came this law?

Socrates: Parmenides taught us, what is not, is not; or said differently, out of nothing, comes nothing. What say you Theaetetus?

Theaetetus: By what you say, foundations come first. For a house is not built from the roof downwards but upwards from its foundations. It can be done in no other way. A man would be a fool to try otherwise. And god knows there are enough fools in Athens today despite and perhaps because of the new philosophy. Yet, whilst Euclid provided a foundation for our science - geometry, he would have had nothing to found were geometrical ideas not already discovered. I say, Euclid provided a new idea, a new notion that placed the ideas of geometry in place, rendered them more economical, and more elegant. And in this sense it is foundational. Whereas the ideas were first excavated out of the ground in a scattered way, he placed them in such a way that their relationships could be seen at most advantage and with the least effort. It is like he has carved and shaped a cube out of the rough marble. His founding was not a founding but a shaping and a placing upon a pedestal. And he has shown us how we can shape other ideas in the same way. The finds were found by many other men, some lost to time. For example, the art of counting which must have been the first mathematics that any man knew. And dazzling it must have been. It is a fine idea that Euclid had, yet what Euclid introduced was borrowed. It is an idea from law for laws are shaped in such a way. With higher laws limiting, shaping and regulating lower ones and each other.

Socrates: Well said. I applaud your very fine speech. It seems that we are agreed that law is fundamental. There is no law except there is no law and this is what is fundamental.

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