Indivisibilty And Its Significance

Post by “Cassius” of December 28, 2019 at 8:25 AM

This is a placeholder to start the discussion of indivisibility, by first going back to why it was an issue for Epicurus in the first place. What questions or positions was he addressing?

Here are some starting points, first from David Sedley's "Lucretius and the Transformation of Greek Wisdom":

Similarly with individual technical terms within his chosen discipline, Lucretius' constant practice is to render Greek technicality neither with Latin technicality nor with mere transliteration, but with a range of his own live metaphors. Take the case of 'atoms'.[4] Of the earlier Latin prose writers on Epicureanism, we know only that Amafinius had rendered the term *corpuscula*,[5] although Lucilius' reference to *atomus . . . Epicuri* (753 Marx) shows that simple transliteration had long been another available expedient. Cicero, for his part, actually shows a strong preference for this transliterated form, with occasional resort to *corpuscula*[6] or to his own probable coinage *individua*, 'indivisibles'. None of these is ideal. Transliteration of a term from within a discipline – as distinct from the name of the discipline itself – is a rare resort for Cicero, and savours of defeat. *Corpuscula* captures the minuteness of the atoms but not their all-important indivisibility. And *individua* suffers in Cicero's philosophical prose from having to stand in for too many different Greek originals: he had already, in his paraphrase of Plato's *Timaeus* (21, 25, 27), used it to represent ἀμέριστος, ἀμερής and ἄσχιστος, all terms with importantly different technical connotations both from each other and from 'atom'.

Lucretius introduces his own set of terms for atoms in the proem to book 1, 54–61, more than 400 lines before his first proof of their existence:[7] *rerum primordia*, *materies*, *genitalia corpora*, *semina rerum*, *corpora prima*. Unlike *corpuscula*, all these concentrate not on the smallness of atoms but on their role as the primitive starting-points from which other entities are built up. In introducing them, he places the chief emphasis on their dynamic generative powers, already indicated in the procreative implications of *materies* (a derivative of *mater*), *genitalia* and *semina*. These implications he then exploits in his first set of arguments, those against generation *ex nihilo*, in the course of which he seeks to persuade us that the biological regularities which are evident at the macroscopic level

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Post by "Cassius" of December 28, 2019 at 12:03 PM

quite likely that he wanted to save the doctrine from the criticisms, notably by Aristotle, offered against the first generation of atomists: Democritus and Leucippus.[11] It is clear, in any case, that Epicurus wished to keep the doctrinal core of atomism, which he shared with Democritus, in the face of criticism from those who preferred to think of matter as continuous, of whom Aristotle is a leading example. As we shall see, Epicurus did not remain content merely to restate wholesale Democritus' view. If he is Democritus' heir, he is so in the sense that he takes up a number of *problems* and offers his own original response. The difficulties produced by Aristotle against the idea of reducing bodies to atoms play an evidently central role in this process. In this light, we may suppose that the first historical impetus for Epicurean physics was the preservation of and support for a discontinuous conception of material composition: to identify the primary material elements and affirm that these atoms are the ultimate indivisible components of matter. However, Aristotle was not content in his attack on Democritus merely to reject atoms in favour of the continuum; he also denounced the general explanation of phenomena which – in his eyes – could not properly account for generation. For Aristotle, on the one hand, the first atomists explained neither the motion nor the organization of matter since they knew only the 'material cause' and not the 'efficient', 'formal' and 'final' causes. On the other hand, their notion of matter, because it consists in juxtaposed existents incapable of intermingling, makes it impossible to understand how a higher-level unity might be produced. It is in effect impossible to understand, according to Aristotle, how a genuine unity can be produced from a plurality of elements, such as the atoms, which cannot cause one another to alter and cannot therefore produce change. Generation, after all, is a kind of change. And unity thus produced is merely apparent.[12] It is possible that the atomists, or Democritus at least, had candidly admitted that the generation of composites was merely apparent since their components – the atoms – was absolutely unalterable. However, as we shall see, that

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Post by "Cassius" of December 28, 2019 at 12:06 PM

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The structure of the atom

The reform of atomism also looks at the very structure of the atom. According to Democritus, the atom, although three-dimensional, is indivisible because of its smallness and solidity. If we set aside a report by Simplicius that attributes to Democritus the idea of atomic parts, we have no reason to question the consensus that a Democritean atom has no parts.[16] Aristotle objected, however, that because of the continuity of motion, the atom cannot escape mathematical division (*Phys.* 240b8–241a6). Even if we suppose with the atomists that it is *physically* indivisible, no extended body can as a whole instantaneously cross a spatial limit. We ought, therefore, to be able to distinguish those parts of the atom which have moved past a certain point and those which have not. For that reason, according to Aristotle, an indivisible 'cannot move nor change in any way' (*Phys.* 240b31). Everything which moves is necessarily divisible, except those accidentally in movement as part of a larger body which is itself in movement.

This is a strong objection: the early atomists make the existence of movement – at least of atomic movement – an unquestionable principle. So Aristotle dismantles the very basis of their physics. It is true that Aristotle conceives of locomotion as the traversal of a spatial medium, while the first atomists seem not to have given a clear account of the status of the space in which it takes place. Their void is essentially the negative interval which separates atoms, not the place *in which* atoms move. But Epicurean void does play the role of an empty space. It is the empty space (*chōra*) in which atoms move.[17] That is why, in order to think of movement, we have to make the (strictly false) supposition that there is a 'top' and a 'bottom' even though the universe is infinite (*Ep. Hdt.* 60).

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Post by "Godfrey" of December 28, 2019 at 12:17 PM

Jumping from the 20 tenets thread....

Cassius, I was curious about Victor Stenger from reading the SofE post that I indirectly linked to in the tenets thread. From browsing on Amazon, his book God and the Atom looks to be exactly what I'm looking for: a discussion of particle theory from an Epicurean perspective. I think I'll start with that book and see where it leads me.

Post by “Godfrey” of December 28, 2019 at 12:28 PM

Oops I crossed posts with your last 2. Is the Epicurean Atomism essay online or just in the CCtoE book?

Post by “Cassius” of December 28, 2019 at 1:28 PM

Godfrey: That is GREAT if you have time to tackle God and the Atom. I recall Alex saying many good things about Stenger and that book in particular. I think I scanned a few pages but that is as far as I got. It would be tremendously helpful if you are able to expand this or related threads with commentary from Stenger.

As far as the clips above those are from the Cambridge books so I don't think there is a full free copy on line.

I know I have read about this in various sources but unfortunately I don't seem to have kept good notes. That was one of the reasons for setting up this forum 

Here's a clip from page 12 of DeWitt's book:

He declared dialectic a superfluity but was able to criticize Plato with great acumen and he wrote against the Megarians, the contemporary experts in logic. He rejected geometry as having no bearing upon problems of conduct but adopted the procedures of Euclid in the composition of his own textbooks. He refuted the assumption of the mathematicians that matter is infinitely divisible, rightly insisting that the result would be zero. This is not the thinking of an ignoramus.

He also exhibits great familiarity with the writings of Plato and he distributed among members of his school the work of refuting or ridiculing his various dialogues. His own classification of the desires is developed from a Platonic hint and he begins to erect his structure of hedonism from the point where this topic was left by Plato. A paragraph is extant in which he warns his disciples against the Platonic view of the universe as described in the *Timaeus*, and elsewhere he pokes a little satirical fun at that famous opus. More than half of his forty Authorized Doctrines are direct contradictions of Platonic teachings.

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The whole issue of "infinity" is charged with implication, both down (infinite divisibility) and "up" (is it right to say that the universe is "infinite" in size, or is "boundless" perhaps a better word?) Because ultimately there must be no mystery to whether something exists or not.....

And of course those issues lead to the closing of the letter to Pythocles:

All these things, Pythocles, you must bear in mind; for thus you will escape in most things from superstition and will be enabled to understand what is akin to them. And most of all **give yourself up to the study of the beginnings and of infinity and of the things akin to them**, and also of the criteria of truth and of the feelings, and of the purpose for which we reason out these things. For these points when they are thoroughly studied will most easily enable you to understand the causes of the details. But those who have not thoroughly taken these things to heart could not rightly study them in themselves, nor have they made their own the reason for observing them.

Post by “Joshua” of December 28, 2019 at 1:37 PM

A feature of interest in the discussion is the idea that atoms were not only thought to be physically indivisible: atoms were also thought to be *conceptually* indivisible.

Post by “Cassius” of December 28, 2019 at 1:45 PM

Yes agreed that is part of the issue. If the word "atom" essentially means indivisible then you have an immediate definitional issue as to whether such a concept can exist. I am not well versed at all on these "ontological" issues -- such as does the fact that we can imagine a god (or an atom) itself mean that it '"exists."

I have to admit that I personally detest what I see as "word games" like I consider this to be. On the other hand, there is little doubt but that this kind of game-playing was rampant in ancient Greece (as it is today) and that Epicurus thought (and I think properly) that it is necessary to deal with it. If you are going to inoculate your school against infection by logic gamesmanship then you need a plan for response.

This thread really isn't off the ground yet and we're basically still brainstorming. We ought to identify and isolate the major threads of the argument and address them separately - once we have a handle on what they are.

Presumably the "plenum" argument is related to this as well, but I don't believe that the two issues are exactly the same, so that's an example of what needs to be split into pieces for analysis.

Post by “Godfrey” of December 28, 2019 at 3:14 PM

Cassius I'll dive into God and the Atom after the new year, hopefully I won't drown! I'll post as I come up for air 🤔

Post by “Elayne” of December 29, 2019 at 2:51 PM

I have read several books by Stenger-- I enjoyed them all. But I haven't read that one, Godfrey, and I'm looking forward to hearing about it.

My intuition about indivisibility is that without it, it might be easier to propose a "god of the gaps"-- a supernatural force whose effects are hiding out in the unmapped territory. If matter were infinitely divisible, we could never describe the behavior of any particle without considering the possible influences of unknown sub-particles, which we could never be finished dividing. It would feed straight into Skepticism, wouldn't it? Intrinsic unknowability of nature?

But Idk if I'm right about that. Someone who is better at physics might give a different answer.

Post by “Cassius” of December 29, 2019 at 4:21 PM

I bet you are correct Elayne at least in large part. There is also probably something going on here too that illustrates the limits of logic when not connected to observation. That might be the same thing, or might not.

It's apparently possible to construct a logic argument that motion is impossible. In contrast, we see and feel motion all the time. In such cases "logic" must give way to the senses.

Post by “Cassius” of December 29, 2019 at 5:34 PM

> Quote from Oscar
>
> one of Zeno's paradoxes. This suggests that there are, supposedly, an infinite amount of steps to complete any distance, that it's hopelessly impossible because it can neither begin nor end. From this, the argument concludes that motion is an illusion.

Yes exactly thank you Oscar! Do you also have a short explanation of the problem with Zeno's argument (other than walking across the room, which I gather is the standard and good! response?

Post by “Godfrey” of December 30, 2019 at 12:14 AM

> Quote
>
> My intuition about indivisibility is that without it, it might be easier to propose a "god of the gaps"-- a supernatural force whose effects are hiding out in the unmapped territory.

Elayne, I've never heard the phrase "god of the gaps", but that's exactly why I'm interested in this topic. Many of the terms thrown around from modern physics can lead the uninformed layman such as myself to consider such an idea. To address that I'm attempting to get more informed, and from what I gather Stenger's book takes that on pretty directly. We'll see!

Post by “Elayne” of December 30, 2019 at 9:19 AM

Oscar, that's a cool video-- I remember my dad teaching me that when I was in 4th grade, but I hadn't thought of it in relationship to this issue of indivisibility. Nice!

It's also a great example of how using our senses, including through their extensions of instruments, gives us primary evidence about reality that is not found in abstract theories. Abstraction is helpful, definitely, but it can't give us accurate information unless real evidence is used. Planck was wise to start from the evidence!

Post by “Elayne” of December 30, 2019 at 9:34 AM

Godfrey, I couldn't recall who came up with that term, so I had to look it up. Cassius will be excited to find out Nietzsche was involved! I think it's very useful-- and the wild thing is that you could put anything you wanted in that gap. You could say everything we don't know is explained by witches, magical unicorns, Zeus, universal consciousness, or an as yet undiscovered type of herb. So you can have one gap person debating another gap person-- "the gap is filled by leprechauns"-- "no, it's by elves"-- and nobody can base an argument on any kind of data.

It has also meant that their gods have gotten squeezed into an ever smaller space. If they want

their gods, that seems like a strategic error, lol.

Post by “Joshua” of December 31, 2019 at 4:38 AM

Regarding "The God of the Gaps", Neil Degrasse Tyson expresses it well;

> Quote
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> If that's how you want to invoke your evidence for God, then God is an ever-receding pocket of scientific ignorance that's getting smaller and smaller and smaller as time moves on.

And to put Elayne's point more concretely, we can look to an argument made in *DRN*. Lucretius makes explicit the analogy that compounds of atoms are a kind of coded information, just as latin letters come together to form words. But in order for this to work out, there must be a *finite* library or alphabet of atomic 'letters'. If they could be infinitely divided, no such set would be possible. In this instance, infinity really does lead to zero.

Post by “Cassius” of December 31, 2019 at 6:59 AM

> Quote from JJElbert
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> Lucretius makes explicit the analogy that compounds of atoms are a kind of coded information, just as latin letters come together to form words. But in order for this to work out, there must be a finite library or alphabet of atomic 'letters'. If they could be infinitely divided, no such set would be possible. In this instance, infinity really does lead to zero.

Hmmmm. There is either a flaw in this reasoning, or it is an EXCELLENT observation and not one that I have personally seen before. Do those reading this agree that an alphabet must be finite in order to convey meaning? Is that what you are saying Joshua? If this argument holds up it is one that we definitely want to use over and over.

Does this go too far?

> Quote from JJElbert

> But in order for this to work out, there must be a finite library or alphabet of atomic 'letters'. If

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Post by “Joshua” of December 31, 2019 at 8:08 AM

Analogies are always flawed. It is certainly the Epicurean position that there are a finite number of kinds of atoms, but an infinite quantity of each kind.

The idea of an infinite alphabet is one I can't really wrap my head around. And of course, for an alphabet and a language to carry meaning implies a subject capable of interpreting meaning. Atoms and their compounded objects don't require a subject.

Post by “Cassius” of December 31, 2019 at 9:27 AM

Yes as to paragraph one.

As to paragraph two, I think you are correct two, Joshua. How could there be any confidence in the meaning of a word that was constructed of an alphabet for which there is no established list of symbols.

Now I guess what I am concerned about is the question of whether an alphabet could start off being a defined set but somehow expand without end, but since the expansion (it would seem) could not be agreed upon ahead of time then the result would surely be at least uncertain, if not totally meaningless.

I think the analogy is probably a very good one but I am looking to test it before reusing it. Since the root of it can be found in Lucretius it is an excellent suggestion.