The Atomic Billiard Board, or: Understanding the Swerve to Mechanistic Determinism

Post by “Charles” of November 11, 2022 at 3:06 PM

> Quote from Karl Marx, Essay on French Materialism
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> *The metaphysics of the seventeenth century, as specially represented for France by Descartes, had materialism for its antagonist from its hour of birth. In person this antagonist confronted Descartes in the shape of Gassendi, the restorer of Epicurean materialism. French and English materialism always remain in close relationship with Democritus and Epicurus.*

I'm writing this brief and abridged summary both as a reference for new-comers or for those unfamiliar with this point in (relative) Epicurean history and for potential future use, on top of forcing myself to publish my thoughts. I'm writing this at work, and I'll likely update it with more robust references, quotes, and examples when I have the time.

Something that has often been discussed, particularly on the Lucretius Podcast, and by me whenever I am discussing 18th Century Epicureans, almost exclusively those in France, is the development and theory of atomic physics. There was a definitive shift in between the atomic swerve of Epicurus and even Lucretius, to the mechanism and materialism of the Enlightenment. The key difference between these is not only in their approach and theory, but primarily when it comes to the question of free will and determinism. For the sake of eliminating redundancy, I won't be explaining much of the source material we know from Epicurus and Lucretius, instead I'll focus on the brief history and overview of the evolution of atomic physics from the many Epicurean thinkers of the Enlightenment, and how it differs.

> Quote from Pierre Gassendi, Epicurean Syntagma
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> *Let us here now admire the wisdom and the foresight of the great Creator of nature, that in regard all our actions and operations are of themselves painful and troublesome, and these also.., being natural, as seeing, hearing c. He hath caused them all to be sweetened with pleasure; and the more necessary these operation are for the preservation of our species, the greater pleasure nature hath allotted them; otherwise all creatures would neglect or forget not only the act of generation, but even eating and drinking itself, if there were not certain natural instigations that stir and move us, and by causing some kind of pain and uneasiness, minds us of the action, which the pleasure that ought to appease this pain and uneasiness, doth promote and*

> *encourage.*

It was Gassendi who brought Epicurus from the brink of obscurity throughout the late Middle Ages and Renaissance and into the Enlightenment. His staunch opposition to Aristotelian Teleology and Cartesianism and his insistence on natural philosophy led to him adopting Epicurus and fashioning him in a much more palatable, Christian version. First by playing the apologist and defending the life of Epicurus, citing Laertius among others the truth behind his biography and dispelling the myths and negative connotations associated with his mere name. Then, by merging the power of God's creation to extend into the creation of atoms, and then the hedonism of men. Although much of Gassendi's work on Epicurus was written in the later end of his life in scattered writings, it wasn't until after his death that his works had been collected and published together. Giving us a time frame of the late 1660's as a starting point. Despite the recuperated form of Epicureanism, Gassendi is rightfully credited with the revival of Epicureanism as a philosophy whose ideas had merit and were worthy of great study and scrutiny. Yet it is from this point, that we see the starting point of a deterministic view of Epicurean materialism.

A contemporary trend growing around this time was also the development of mechanism. Some of its earliest proponents included the likes of Bernard Lamy, Newton, Descartes, and to a lesser extent Leibniz. The basic premise of mechanism is that throughout nature, there are certain processes that, which are inter-linked, are all the result of mechanical principles and sequences in a sort of causal manner. The earlier thinkers applied mechanism almost exclusively to nature and not to human nature. Both are extraordinarily deterministic no matter how these mechanistic processes are designed and executed. Yet alongside this growing theory, some applied it to human nature. Among the first was Hobbes, but later, and more importantly was Julien Offray de la Mettrie, whom I've written about and have made many threads about on this forum.

La Mettrie, a somewhat radical Epicurean, advanced the field of mechanism and materialism with the publishing of his book "Machine Man" (or Man a Machine). Which advocated the idea that all human functions can be reduced a series of chemical and mechanical principles acting upon one another, that the soul itself is made of matter, and that it is in our nature to pursue pleasure. In addition to denying the feasibility of free will through the logic of these biological principles. Although this position was not unique to La Mettrie, as contemporaries and some before him had advocated this idea before, La Mettrie is being mentioned solely for his self-professed Epicurean beliefs.

> Quote from La Mettrie, Man a Machine
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> That is certainly the most that can be said in favor of the existence of God: although the last argument is frivolous in that these conversions are short, and the mind almost

> always regains its former opinions and acts accordingly, as soon as it has regained or rather rediscovered its strength in that of the body. That is, at least, much more than was said by the physician Diderot, in his “Pensées Philosophiques,” a sublime work that will not convince a single atheist. What reply can, in truth, be made to a man who says, “We do not know nature; causes hidden in her breast might have produced everything. In your turn, observe the polyp of Trembley: does it not contain in itself the causes which bring about regeneration? Why then would it be absurd to think that there are physical causes by reason of which everything has been made, and to which the whole chain of this vast universe is so necessarily bound and held that nothing which happens, could have failed to happen, causes, of which we are so invincibly ignorant that we have had recourse to a God, who, as some aver, is not so much as a logical entity? Thus to destroy chance is not to prove the existence of a supreme being, since there may be some other thing which is neither chance nor God—I mean, nature. It follows that the study of nature can make only unbelievers; and the way of thinking of all its more successful investigators proves this.”
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> [...]
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> In fact, if what thinks in my brain is not a part of this organ and therefore of the whole body, why does my blood boil, and the fever of my mind pass into my veins, when lying quietly in bed, I am forming the plan of some work or carrying on an abstract calculation? Put this question to men of imagination, to great poets, to men who are enraptured by the felicitous expression of sentiment, and transported by an exquisite fancy or by the charms of nature, of truth, or of virtue! By their enthusiasm, by what they will tell you they have experienced, you will judge the cause by its effects; by that harmony which Borelli, a mere anatomist, understood better than all the Leibnizians, you will comprehend the material unity of man. In short, if the nerve-tension which causes pain occasions also the fever by which the distracted mind loses its will-power, and if, conversely, the mind too much excited, disturbs the body (and kindles that inner fire which killed Bayle while he was still so young); if an agitation rouses my desire and my ardent wish for what, a moment ago, I cared nothing about, and if in their turn certain brain impressions excite the same longing and the same desires, then why should we regard as double what is manifestly one being? In vain you fall back on the power of the will, since for one order that the will gives, it bows a hundred times to the yoke. And what wonder that in health the body obeys, since a torrent of blood and of animal spirits forces its obedience, and since the will has as ministers an invisible legion of fluids swifter than lightning and ever ready to do its bidding! But as the power of the will is exercised by means of the nerves, it is likewise limited by them.....

In borrowing heavily from Holbach and making an allusion to a quote found within his System of Nature, La Mettrie makes his stance clear. “Nothing which happens, could have failed to

happen.” In a Materialist philosophy, Nature reigns supreme, and if Nature is the regarded as the creator of all things chemical and physical in plant, animal, man, and even matter and energy, then every person would be comprised of the same constituent parts. It is only their unique combinations that serve to separate one from another. As such, these constituent parts are also what compel us towards pleasure and drive us from pain. This was the position taken by many of the Enlightenment era thinkers inspired by Gassendi and Lucretius within the context of France's own budding field of natural philosophy and science.

For now I'll publish the thread, but throughout the weekend I'll try and update it with some further alterations and compare the different developments from other self-proclaimed Epicureans, such as Holbach, Boyer, or Sade. Hopefully by the end of this little endeavor there will be a consistent trend and timeline in the advancement of this idea from Epicurus into the Enlightenment. I personally suspect that the increasingly popular and common usage of "Nature" as a shoe in for a creator or deity bears some responsibility for this difference.

Post by “Charles” of November 11, 2022 at 4:21 PM

Cassius Can this thread be moved over to Agency / Free Will - Epicureanfriends.com?

Post by “Cassius” of November 11, 2022 at 6:56 PM

Will do so now ... been feeling poorly today and somehow i didn't see this new post so glad you asked!

Post by “Cassius” of November 11, 2022 at 7:04 PM

Just read the post. Excellent work Charles and I look forward to reading more. The whole subject of why these thinkers adopted so much of Epicurus' viewpoint on atomism but rejected his view of the swerve is highly interesting and a topic worthy of its own discussion. It they were willing to risk the wrath of the church on atomism, why not go all the way and embrace

the swerve too?

I have some speculation on that, relating to epistemology and Epicurus' views on the primacy of the senses rather than "logic" (which they may have found even hotter to handle than the supernatural gods issue) but it's only speculation. I hope you will find good references that will help make the answer more clear.

Post by “Martin” of November 12, 2022 at 5:10 AM

Prior to 20th century quantum mechanics or a thorough understanding of classical thermodynamics (which happened only after quantum mechanics), hard determinism appeared to be the most fitting to a materialist world view. I certainly would have fallen for the same trap. Embracing the swerve would have left a loophole for the church. Hard determinism rather than the swerve was going "all the way" at that time.

Post by “Cassius” of November 12, 2022 at 6:55 AM

> Quote from Martin
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> hard determinism appeared to be the most fitting to a materialist world view

It's very interesting that Epicurus did not think so. That article by Sedley which talks about the swerve being more the product of Epicurus' logical reasoning on epistemology (I think it was) rather than in physics may be the best explanation, and also a guidepost for us in understanding better how he thought and the correctness of his view. I will find and link that here.

I am pretty sure it is this one, now to see if I can point to the right section. Here's the article, Sedley: "Epicurus' Refutation of Determinism" and here's a link to a thread discussing it: Sedley: "Epicurus' Refutation of Determinism"

I was thinking I would find something more pithy but this interesting page has basically the assertion I remember:

credit for anticipating 20th-century quantum physics. On the other hand, he deserves more admiration than he usually receives for arriving at the possibility of physical indeterminism within atomism on purely a priori grounds. During the long reign of Newtonian physics only one thinker, C.S. Peirce, had the wisdom to point out that its overwhelming predictive success did not, and indeed never could, rule out the existence of indeterminism at a level below the range of the most accurate measuring instruments.[3] Epicurus' insight was a comparably bold one when he reasoned, in defence of the swerve, that no amount of observation of falling objects' trajectories could establish that they were perfectly rectilinear to *any* degree of accuracy (Lucretius II 246-50).

I do not propose to expend much discussion on the swerve's cosmogonical function (Lucretius II 216-42), which I suspect to be a problem dreamed up with a preconceived solution in mind. Chains of atomic collisions in extra-cosmic space could have quite adequately been explained by the lateral intrusion of one or more atoms from elsewhere, despatched, say, by the break-up of a nearby world. The question of how such collisions ever started in the first place would not arise, given the infinity of past time and past worlds. That is, indeed, the view strongly implied by the *Letter to Herodotus* and the *Letter to Pythocles*,[4] the physical epitomes which Epicurus wrote when he had already worked out his main cosmological views in Books I-XIII of his *On nature*. Since these two works also contain no hint of the swerve doctrine, the likelihood is that it was his later work on psychology, apparently in the closing books of the thirty-seven book magnum opus, that led him to the innovation, and that it was only then grafted onto the existing cosmological scheme.[5]

[3] C.S. PEIRCE, *Collected papers* 6 (1935), esp. p. 35, 37.
[4] *Ep. Hdt.* 44; *Ep. Pyth.* 89.
[5] See my *The structure of Epicurus' On nature*, «CErc» 4 (1974), pp. 89-92, and *Epicurus and the mathematicians of Cyzicus*, «CErc» 6 (1976), pp. 23-54, note 73, for this chronology.

And this is the interesting comment in Lucretius of which I would never have seen the significance without Sedley's article:

> Quote from Lucretius Book 2
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> For all things that fall through the water and thin air, these things must needs quicken their fall in proportion to their weights, just because the body of water and the thin

> nature of air cannot check each thing equally, but give place more quickly when overcome by heavier bodies. But, on the other hand, the empty void cannot on any side, at any time, support anything, but rather, as its own nature desires, it continues to give place; wherefore all things must needs be borne on through the calm void, moving at equal rate with unequal weights. The heavier will not then ever be able to fall on the lighter from above, nor of themselves bring about the blows, which make diverse the movements, by which nature carries things on. Wherefore, again and again, it must needs be that the first-bodies swerve a little; yet not more than the very least, lest we seem to be imagining a sideways movement, and the truth refute it. For this we see plain and evident, that bodies, as far as in them lies, cannot travel sideways, since they fall headlong from above, as far as you can descry. But that nothing at all swerves from the straight direction of its path, what sense is there which can descry?

Post by “Cassius” of November 12, 2022 at 9:16 AM

Charles do not let me hijack this thread but I have another comment which I also think is relevant, and it relates to the cliche that "absence of evidence of a thing is not evidence of the absence of that thing." See: https://en.wikipedia.org/wiki/Evidence_of_absence

> Quote
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> Evidence of absence and absence of evidence are similar but distinct concepts. This distinction is captured in the aphorism "Absence of evidence is not evidence of absence." Often attributed to Martin Rees or Carl Sagan, versions of this antimetabole appeared as early as the 19th century.[1] In Sagan's words, the expression is a critique of the "impatience with ambiguity" exhibited by appeals to ignorance.[2] Despite what the expression may seem to imply, a lack of evidence can be informative. For example, when testing a new drug, if no harmful effects are observed then this suggests that the drug is safe.[3] This is because, if the drug were harmful, evidence of that fact can be expected to turn up during testing. The expectation of evidence makes its absence significant.[4]

When you combine that with Epicurus' observation that: "*But that nothing at all swerves from the straight direction of its path, what sense is there which can descry?*" as explained by Sedley, you have I think the key to observing that these earlier materialists were regressing from Epicurus rather than progressing. And why did they do so, given that Lucretius was plainly in front of them?

I would say that they regressed due to their failure to appreciate the epistemological issues that Epicurus had identified in "waiting" and also in rigorously making sure that *all* evidence that bears on a subject is included in the opinion. Following Sedley's lead, they should have realized that we can in our own observation plainly observe - and therefore we can confidently conclude -- that some free will exists. "Will I pick up the salt or the pepper first?" Nothing by our own minds decides which we will do. Given then that free will exists to any degree, there must be a mechanism at the atomic level which allows for non-mechanical operations of at least some atoms at some times. I suspect Sedley is correct and this is the true origin of the swerve theory.

Personally I would say the same thing applies to the size of the universe and also to its eternality. Today, no matter how many times astronomers look in their telescopes (or the equivalent) and say that "all matter is expanding outward" they always have to keep in mind that this observation applies only to the limits of their observations. At to the size of the universe the logical arguments that Epicurus raised that what we observe is not compatible with limited void but unlimited matter, or with unlimited matter and limited void, but only with unlimited matter AND unlimited void, still carry weight -- and for me personally I believe them to be decisive. The same thing goes that nothing comes from nothing and therefore there was never a beginning point for the universe as a whole. Everyone's personal mileage on these issues may vary, but this seems to be the was Epicurus was reasoning and it surely seems persuasive to me.

But while "your mileage may vary" on any individual question, it ought to be accepted by everyone IMHO that observations must always be evaluated within the limits of what they are able to perceive. Epicurus wasn't strictly an empiricist and he didn't (like Frances Wright seems to have done) swear off having confidence in theories where he found the confidence warranted. To do so - to say that no conclusions are ever possible unless you have observed something personally yourself - would be (as a friend observed to me once) an extreme form of skepticism in itself.

I would expect that as we read back through the last several hundred years of materialism that that is what we are going to find -- that these scholars, whether under the influence of the church or otherwise - failed to appreciate the epistemological issues that Epicurus and Lucretius interwove into their physics.

Post by “Charles” of November 17, 2022 at 10:52 AM

Just returning to this article after being busy with other projects. While ruminating on the subject I thought maybe this has to do with a sort of split between Newton and Gassendi, branching off into two distinct yet both causally deterministic paths that left Lucretius and Epicurus behind: the one of god's iron will and predictable physical mechanics.

Food for thought.