Intro

Metaphysics of Physics is the much needed and crucial voice of reason in the philosophy of science, rarely found anywhere else in the world today. We are equipped with the fundamental principles of a rational philosophy that gives us the edge, may make us misfits in the mainstream sciences but also attracts rational minds to our community.

With this show, we are fighting for a more rational world, mostly by looking through the lens of the philosophy of science. We raise awareness of issues within the philosophy of science and present alternative and rational approaches.

We are your hosts and guides through the hallowed halls of the philosophy of science. Dwayne Davies, my husband, is the founder, primary content creator and voice for Metaphysics of Physics. I am Ashna and I help out however I can. You can find out more about us on the About page of the website.

You can also find all the episodes, transcripts, subscription options and more on the website at metaphysicsofphysics.com.

Hi everyone! This is episode twenty of the Metaphysics of Physics podcast and today we are going to continue our discussion of "A Rational Cosmology", a book we started discussing in episode seventeen of the podcast. You might want to listen to that first. You can find the link to that episode in the transcript.

Today we are going to continue our discussion of the book and spend more time discussing some of the book's philosophical issues.

We are still on some basic metaphysical issues. In this article, we will discuss space and matter. Why there is no such physical entity as space but there is space as a relationship. Then we move on to the pervasive qualities of matter.

You can find the book at the link provided in the transcript.

Without any further ado, let us get started.

Essay XI: Why There is No Such Thing as Space

This essay starts on page 19. It starts off with this:

"There is no such thing as 'space.' In order to be defined as an entity, space would need to meet the first ontological corollary, which states that an entity is the sum of its qualities. In order to pass this test, space must have some qualities in the first place.

But space lacks any qualities whatsoever. 'Space' cannot be said to have mass or a finite volume. As previously proved, there is no finite boundary at which "space" officially ends, nor is there a finite shape that "the entirety of space" can be fit into. "

It is true, there is no such *physical entity* as space. It is a mental entity, a concept used to indicate relationships between positions. When the author says "entity" he is always discussing physical entities. We shall stick to this convention and when we say "entity" this what we are discussing unless we say otherwise.

Is an entity the sum of its qualities? No. That implies that qualities are primary. And that entities are made out of their qualities. Which is not the case. Physical entities exist and that implies that they possess qualities. If that is what the author means, then that is perfectly fine.

What is space?

It is a concept which indicates relationships between positions. What does this mean?

Suppose that we consider a room in our house, say the living room. The living room is that part of the house between the four walls of the living room and between those four walls is some "space".

The "space" within that room simply indicates relationships between the positions of those four walls. One wall is over here, another wall is over *there* and the other two are other *there* and *there*. In between is all this space. The space essentially refers to the separation between objects. This "space" then forms some area or volume in which you can find things.

Space is simply the relationships between boundaries of some kind of container or some otherwise defined set of bounding objects.

So, for instance, you can walk into the living room and say "Well, we have these walls. They are in different positions. There are other positions in between them.". And the sum of those other positions is the "space" inside the room.

Does this imply that there are no other things in those positions? No. The concept of position only applies to entities and only entities can have a position. There is no position of "a non-entity" or of nothing. Position is a quality and a quality is a quality *of something*.

Is this space absence of being? Early philosophers tended to think so. But this is not the case. There is no such thing as empty space.

What would empty space refer to? Some kind of "here" where there are no entities. Where nothing exists. But, how can there be any *here* without something that exists? How can there be any *here* separate from anything that exists? Unless there is a *something* there is no *here*.

Hence, there is no such thing as "empty" space. Or in other words, there is only space where there are things with position. To allege the existence of empty space is to talk about position without entities to have position and is a contradiction in terms.

No, space is not the absence of objects. It is not some backdrop upon which you can lay things that exist. For there to be any space, something must already exist.

Is it a combination of dimensions, as alleged by modern physics? Most certainly not. What would that even mean?

The word dimension has two primary uses in the sciences. The first is geometrical. It assigns some position as a starting point. And then measures the relative position of other objects relative to that starting point.

It measures the relative positions of something relative to that starting point by measuring in three directions: up/down, left/right or back/forward. The details are not all that important. What is essential is that the measurement is performed by a combination of measurements in three different directions. Each of these directions is a separate dimension.

What does this measure? The position of that object relative to the starting point. The concept of dimension is a mathematical abstraction. It uses quantities to represent that relative position.

(That is three-dimensions. You can, of course, perform similar measurements in two dimensions if you wish to ignore the separation between objects in the direction that corresponds to "depth").

[Editorial: Or, of course, one dimension, if you want to consider things alone a single line.]

Dimension is therefore simply a mathematical abstraction which allows relative positions to be numerically quantified. It is also used for various other geometric purposes. In any case, dimension is a mathematical abstraction used for the purpose of measurement.

The second use of the word dimension is far more mathematically abstract and we will not go into it here. Suffice to say that it too is a mathematical abstraction and does not justify considering space a combination of dimensions.

We may use the concept of dimensions to perform measurements on space but the concept of space is a more fundamental concept than that of “dimension”.

This explanation of "what is space?" is part of one our subscription articles, link provided in the transcript. Check it out for a further explanation of space, time and dimensions.

So, does space have any qualities?

Yes. One can measure the volume or area of space and quantify the extent of that space. One can assign it a finite area or volume.

"Moreover, though separate stretches of what can be termed "space" are measurable (such as the distance between Entity A and Entity B), linear measurements in three dimensions cannot be attributed to the totality of space. As an example, it would be absurd to propose that the entirety of space is twelve billion kilometres long, three billion kilometres wide, and sixteen billion kilometres high"

Here the author is talking about all the relationships we call space considered as a totality. That is, all of "outer space" and all the "space" on Earth.

It is true that this totality of smaller spaces has no measurable qualities. There is no way to quantify the extent of this. This indeed has no qualities. It is simply a totality of all the space between all the things in

the universe. There is no way to assign it quantifiable qualities, therefore it has no measurable qualities.

But there isn't much value in considering space in that sense. There isn't any value in lumping all these spaces into a larger collection and calling this "space". The only sense in which the concept "space" has any potentially significant value, is when you consider a given region of space as delimited in some way. And not as some collection of all these spaces.

But even then, the concept of space is not all that important to either philosophy or physics.

But how is that? Does physics not speak of the curvature of space?

It does, but this is not an idea with any merit. Space is an abstraction; it deals with relative positions. And as an abstract relationship, it can no more curve than my relationship with my husband.

[Editorial: paraphrasing David Harriman.]

Things curve, but abstractions do not. Trying to explain gravity by the curvature of an abstraction explains nothing. It simply reifies an abstraction. It is a failure to do physics.

The author discusses empty space and correctly dismisses it as invalid for the same reasons we have already discussed. To quote him:

"There is nothing more to be discovered about nothing!".

We certainly agree with this!

Essay XII: Space as Relationship

"The term 'space-as-relationship' is synonymous with 'distance' and 'separation'. In order to have any meaning, it cannot be a metaphysical primary. Rather, it must involve two or more distinct entities, or a single entity capable of motion and having its current position compared with respect to some earlier or later position."

We have already discussed in what way space is a relationship which describes the distance or separation between entities.

"Thus, the degree to which the boundary of one entity can be separated from that of another can differ in magnitude. This variable separation is the reason for man's need to use the term "space-as-relationship"

The variable separation is what makes the concept of space useful. And what makes quite a lot of geometry useful. Quite a lot of geometry is applicable to measuring the volume or area of space. And being able to measure the volume or area of space is very useful in many areas of life. This is why space is a very useful concept in general.

But, still, space is not all that useful in physics, which is about the fundamental nature of the universe and not about solving practical problems such as finding out how much land you have so you can find out how many cows to put on it.

Essay XIII: The Ubiquitous Nature of Matter

"Space-as-relationship is not a single relationship. Rather, it is a threefold relationship, describable by three parameters, known as dimensions. This is primarily deduced not from the nature of the relationship "space", but from the natures of all entities as such.

Here we find the need to define several qualities which must be possessed, in some quantity, by any entity. We shall call these the ubiquitous qualities of entities.

Matter – Matter is otherwise known as the constituent quality of entities. Matter is simply that, which entities are made of, and without which they cannot have any other qualities ."

Indeed. Matter is the "stuff" making up physical entities. As opposed to mental entities, that is abstractions. Matter is the most fundamental kind of existent there is. Should we find the most fundamental thing in physics, it will be a form of matter. And ultimately, physics describes the behaviour of matter.

Matter is therefore clearly important to physics and finding some of its ubiquitous qualities should prove quite useful.

Are there qualities which all matter must possess? Regardless of what "kind" of matter it might be? Be it the smallest subatomic particle or the largest star?

Yes, there are. And as the author discusses, length, width and depth are three such qualities.

The most fundamental existents in the universe, the most fundamental particles (or whatever) are certainly a form of matter. And will possess these ubiquitous qualities.

Of course, it is not the role of philosophy to determine what the most fundamental "building blocks" of nature are. It is the role of Physics to try to figure that out.

We will move away from discussing the most fundamental things and keep in mind that whatever these fundamental things are, they will possess these qualities.

“It may be asked here, 'What, then, are such things as freedom, beauty, and peace, which are not in themselves composed of matter?' But these are not things as such! They are not entities, but rather relationships between entities that are composed of matter."

Freedom, beauty, peace and the like are abstractions. They are abstractions which describe relationships of entities or qualities of entities. But these do not refer to ubiquitous qualities of matter.

There would be very few of these ubiquitous qualities. And many so-called "qualities" are not qualities!

For instance, colour is not a quality of matter. Colour is not "in the object". Colour is a means of perceiving how different objects interact with light. But colour is not a quality of anything.

You can read more about our view of colour in this subscription article.

So, what would qualify?

Length, width, height, volume would all be good candidates. All matter possesses these measurable qualities.

Essay XIV: The Ubiquitous Qualities of Length, Width and Height

" [W]e now proceed to consider other qualities which are universal to all entities: volume, length, width and height."

That is true, all entities must possess all these properties. They must possess length, width and height and therefore this implies that they have a measurable volume.

These are measurements of its spatial extension. That is, the "space" taken up by that object. Length, width and height measure different aspects of this space, each performing a measurement along a different spatial dimension. One can combine all three of these values to produce a numerical measurement of how much space something occupies, which we call volume.

"There are three independent linear measurements, which are mutually perpendicular. Any other linear measurement is, in fact, some combination (a vector sum) of any or all of these three mutually perpendicular linear qualities, which are known as length, width, and height (or, in the three-dimensional Cartesian coordinate system, as values along the x, y, and z-axes). Length, width, and height, as qualities, can also be termed dimensions.

It is important to note that these dimensions do not exist independently, but rather pertain to the entities that exhibit them. Each entity must have a certain maximum length, width, and height, though these measurements may vary in some relation to one another, i.e., depending on the particular region of the entity one examines."

Dimension is a mathematical concept which applies to objects. But not to empty space, that is, "space" separate from entities. Dimension is a conceptual method allowing the measurement of matter.

"Because, moreover, all entities exhibit the three dimensions as qualities, their separation can only be expressed as a combination of three measurement parameters. After all, one entity can be separated from another by a distance A in the X direction, as well as by the same distance in either the Y or the Z direction. In each of these three cases, the relationships are not the same, and were there four entities thus positioned (including the original entity and the three entities separate from it), each would occupy a distinct position and would be separated from every other. "

[Editorial: The dimensions are not qualities of physical entities. They are a combination of mathematical methods used to measure qualities of physical entities.]

No. The separation between entities need not be measured in three dimensions.

For instance, suppose someone is standing to my left, along a straight line. I want to know how far to the left he is. I only need to consider one dimension to figure this out.

Or, suppose I have a two-dimensional drawing of two circles, located diagonally from each other. I want to quantify how far apart they are. Well, I only need to consider two dimensions to do this.

This is a contextual issue. Sometimes you consider three dimensions. Other times fewer.

Before we get out of here though, let's give a shout-out to our patron, Steve Hathway! He donated to our Facebook Subscription pledge and got a years access to our subscription content! Thank you for helping us make the world a more rational place!

Alright, that brings us to the end of this episode. Thanks for listening!

Outro

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Please tune in for the next episode and start thinking of some questions! Until then, stay rational!