In what ways does the nature of space pose a problem for philosophy?

The issue of space and its nature has engaged the thoughts of philosophers from pre-Socratic through to contemporary times. Furthermore, their ideas have been repeatedly challenged by the development of scientific knowledge and theory at different stages during this period. While physics and mathematics have developed theories of space that apparently define reality, thereby making metaphysical problems obsolete, in this essay I will argue that these problems are still an unresolved issue for philosophy. The philosopher who probes below the surface of the physicists' observations, explanations and theories, will probably find their scientific certainties unsatisfactory. Within the confines of this short essay, I will highlight some of these questions of space that continue to pose problems for philosophers.

The most fundamental problem is, perhaps, what do we mean by the term 'space' itself? We think of space as the absence of something - say an empty seat on a train, room on a shelf or in a cupboard etc. Therefore is it the case that space is the absence of any thing? Here modern theoretical physics holds that space is not truly empty - put simply, apart from matter in the more familiar form, there is particulate/ wave energy, together with the space-time continuum that interacts with matter causing space to curve. In addition, mathematicians speak of non-Euclidean geometry which rejects conventional linearity of space but holds that it may have curvature. These theories, underpinned by complex mathematics, imply that the nature of space has been resolved.

Philosophically, how should we respond to these scientific explanations? What can we say about space? Surely it *is* the absence of anything. Let us take away all the matter and particles and energy waves, what would remain? If space were to be curved, or even linear as we are accustomed to thinking, there must be *something* to curve. How can 'nothing' have the property of curvature? If there is a property, then that property must be of something, an issue that I will return to shortly. In speech we often talk of space as implying the place-holder into which something can be put. But this just suits our commonplace language, and it may be that metaphysically space could be considered to be nothing. But it is a nothing that seems to contain stuff - material substance, and this stuff occupies space with absolute locations, or positions relative to other located stuff. It does not seem clear how absence of anything can be a receptacle for substance and act as a place for the location for things.

This is all very well, but it still leaves problems about the nature of space. If space is 'nothing', can it still have some sort of nature? If we think of space as an emptiness, is it one that has extension: is it infinite or bounded? If we travel in an exactly straight line (ignoring the mathematicians' concept of the curvature of space), what would happen? Would we just continue for ever, or would we reach a boundary? If we think of a boundary like a box, the side of a box consists of two faces, one on the inside at which is the space-box interface, and another on the outside which is the interface of the box-*whatever*? That is, this outside face acts as the interface for whatever is outside the box (in the world this is usually the atmosphere, or perhaps water). But if space ends at a boundary, what then would the second face of the boundary consist of? Could there be such a thing as a

single-sided boundary? That seems peculiar. If space is contained, what contains it? Furthermore why should space, if it is completely empty have an end? But if it does end, what would be the location or reason for such an endpoint? What could possibly privilege such a specific position? Of course, we can easily be confused by our own perceptions of a world of three dimensions, of space extended around us with things in their Cartesian locations. While it could be postulated, for example by physicists and mathematicians, that space is multi-dimensional, we should also consider the possibility that it is dimensionless. Considering these questions above, it would seem as though space should be infinitely empty, but as it is not possible to directly perceive the absence of something, then there is nothing to entail that space is or is not, there.

If space were to be considered as the absence of anything, it is however still a real part of the universe. From this fact arise two further considerations. Firstly, as mentioned above, can space have properties? There could be, perhaps, properties of absence, or nothingness, or being infinite, or being empty or being a receptacle for stuff. Furthermore, mathematics may be correct about the properties of dimensionality or curvature or some other characteristic of space. If so, what does it mean for 'nothing' to have properties? Can 'nothing' with a set of properties really be nothing at all? Secondly, how does space proposed as 'nothing' and yet still real, fit with the concept of possible worlds? If there is one overall space that envelops all the individual spaces of each possible world, it is difficult to see how each individual world's space can be entirely separate from others. On the other hand, does each possible world with its separate spatio-temporality have its own unique space? If so, what are all these spaces and how do they fit together into

any sort of unity - is there another super-space that contains them?

Finally, notwithstanding these thoughts about space and its nature, there remains another possibility that should be considered. Perhaps space does not exist at all. The philosophical position of idealism suggests that we are deceived by our senses, and that all we perceive is a result of our consciousness. However as modern physics suggests that the reality of the world is nothing at all like the world which we perceive through our senses, perhaps the concept of idealism has some virtue, in that our sense-data are supplying a misleading construction of reality within our mind. So if the mind's familiar construct of a space containing stuff is not real, but is all situated in the mind, this has the attraction of confirming that space is indeed 'nothing' as discussed above. However this argument holds that the stuff in space is also unreal. This thought may be a step too far, so if we want 'things in space' to be real, how can that space in which they exist be anything but real? On the other hand, if we allow that substance itself were also to be unreal, mere ideas of our consciousness, that would solve our problems of space being a physical container for the location, whether absolute or relative, of stuff.

These problems about the nature of space are difficult for philosophy, but they do stand in contrast to the explanations of physics and mathematics. While their descriptions of its nature are couched in complex mathematics which is beyond the interpretation of many, a philosophical description is temptingly more straightforward until the issues are examined. To try to establish and even question the metaphysics of space is fraught with difficulties, but they are as one may expect when philosophizing about 'something' that is paradoxically 'nothing'.