THE MICROCOSM

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Relativity is seriously flawed as a theory of reality. However, it is very often the case that even a flawed theory is acceptable when no viable alternative is offered. When this happens, the flaws are made invisible, and carried into every idea that subsequently shapes concepts without a possibility of detection. It may seem strange to imagine that what is going to be developed here is in some ways an alternative intending to render those flaws visible. However, it is not so much that the interest here is relativity. The meaning of microcosm as it will be developed requires that it should be offered up against reality in comparison. Since no idea or theory ever really does this, the intention is to compare ideas against each other. When this happens, it is clear that a certain dissonance takes place, and so it becomes necessary to look at relativity since the dissonance comes from there. It should be stressed, however, that this is not intended as a scientific enterprise. Far from it. This notion of microcosm begins its life by looking for novel ways of approaching a more tangible and accessible meaning. As such, it lies outside the traditional purview of science, yet paradoxically has something to say about the nature of reality. Consequently, the lines of distinction that are traditionally drawn between subject areas inevitably become blurred.

Microcosm is generally considered in fairly abstract terms: a part reflects a whole, or more generally, all things are connected. Poetically and artistically, it is also suggestive of man as a reflection of the whole. But here, it may be more useful to think of the microcosm as a fraction – the word 'fraction' already holds within itself a denominator form that expresses the idea of the whole of which it is a part.

But in terms of microcosm, the fraction must be raised to a different level of wholeness. The fraction and the whole as it is usually meant is suggestive of a particular grouping, such that a segment of an orange, for instance can be expressed as a fraction of the orange as the whole of which it is a part: $1/8^{th}$ of the orange, say. Or two parts become $2/8^{ths}$ or 1/4. Even here, in the traditional cancelling process to simplify the mathematical form, the two parts should be thought of as separated from the other six and also separated between themselves, while a quarter may be the same, except that the two parts are joined together.

But here, one is to imagine that the fraction implies a different level of wholeness. To see it in some kind of visual form, it can be thought of in quantitative terms. If we were to weigh a rock on a scale, we might imagine that we can read off the measurement and declare with some confidence that it weighs so many ounces, pounds, grammes or kilos. It is the use of these specific words that tend to make us think of the part as a whole in itself represented by fixed standards of measurement. But in considering this without reference to the terms of measurement, we begin to approach something of the kind of thought implied by microcosm. It is, in other words, just as feasible to say that whatever it weighs, the measurement represents a fraction of the whole as a separate entity, the separate entity being the rock and the whole being the earth. One can express this just like a fraction:

$$\frac{\text{Stone}}{\text{Earth}}$$

But now, when we consider the weight of the earth, it is just as feasible to see this as yet another fraction, which is the separate earth, including stone, over the denominator 'solar system':

$$\cfrac{\cfrac{\text{Stone}}{\text{Earth}}}{\text{Solar system}}$$

One can continue in this way of referencing parts to wholes, where each whole is part of a bigger whole, such as the local grouping of stars, the particular arm of the Milky Way, the Milky Way itself, the local group of galaxies and so on until the very bottom denominator would be the universe, or totality.

Of course, when engaged in activities in a practical way, as in cookery, we do not think of such notions of parts, wholes and microcosm, even though engaged with them. A recipe would become totally unwieldy, and for good reason. A pound of butter, expressed as a fraction of the universe would be unmanageable, and meaningless since inapplicable. One would get into trouble instantly in mixing it with 4 ounces of sugar, since that expression would not show clearly the difference between them at the particular level of uses. Even so, this in itself is a highly significant point, but let this be put to one side for the moment and returned to later.

Consider again the fraction in its layered form:

$$\cfrac{\cfrac{\cfrac{\cfrac{\text{Stone}}{\text{Earth}}}{\text{Solar system}}}{\text{(Everything in between)}}}{\text{Universe}}$$

In reality, 'everything in between' could be a much longer line of denominators, and represents all the levels composing the whole. It might be asked, however, why not dispense entirely with all these levels and merely consider the stone as a fraction of the whole which is ultimately the universe.

Consider the stone sitting on the scale, the measurement on the scale and the earth. Clearly, the measurement represents a certain degree of separation between the earth and the stone. However, when these two, the stone and the earth, are seen as a fraction of the solar system, then it is in that comparison that the earth and stone are not seen as separate entities, since their proximity to each other, even though separate, constitutes their singular form as a fraction of the solar system. All the parts of the solar system, as separate as each moon and planet may be, are then a singular form acting as numerator for the local group of stars and so on. In effect, whatever is considered as the part is also a 'one'. So that it is necessary to see the totality as a structure, virtually a one in itself, but which is nonetheless a composition of ones. One can catch a glimpse here of how the microcosm is beginning to reflect the macrocosm in that any part, however composite, is always a one in structure, though at the same time a fraction.

What could one use by way of analogy to make this clearer? The economist Adam Smith once wrote that the knowledge of the impending death of a number of people in a faraway land would not cause us to lose much sleep, much as we might deplore it. But if told that the top of one's finger was to be amputated in the morning, one might well be filled with anxieties and a sleepless night. Here, one can see something of the beginnings of cheap labour in foreign climes, since we are generally unaffected by distant events to people we do not know, but this is not really the point of interest. Consider this from a slightly different perspective; our emotional response to the death of a person will be tempered enormously by the degree to which we are or are not acquainted with them. If it is the death of a member of one's own family, the sadness felt will be greater or less in considering distant cousins, grand-parents, parents, siblings, one's own wife or husband or children. It may be different again for close friends, or for acquaintances, for people one admires or dislikes and so on. In effect, each response is graduated and determined by degrees of closeness or separateness. Indeed, even the loss of complete strangers can have an effect, and may be determined by the feeling that he, she or they belong to the same ethnic or racial group. It is not difficult to see that there is not a blanket response that covers all. There is a structure, and that structure is determined by different degrees of affinity or separation. Is it a coincidence that such an emotive structure has a striking similarity to the microcosmic structure just discussed concerning the weight of things? This is a second point that is also highly significant and shall be returned to a little later. As an incentive, consider why it is that when the deepest kind of emotive reaction is concerned, as in the human response to falling in love, it is a common reaction to regard the beloved, (the individual) in terms that are quite macroscopic or epic: the world, the moon and stars, the sun etc. For the moment, it is interesting to note that this emotive structure is excluded as a matter of course in all ideas representing physical reality in terms of cosmos, and yet the microcosm, while it suits the emotive level of expression in terms of its structure of levels, may have more to do with the fundamental nature of reality as a felt state than is currently thought.

But it should be said here that this view of the microcosm is not altogether new, and in some respects it is already incorporated in the overall philosophical structure of science, and relativity in particular: it is called 'Mach's principle'. Ernst Mach explains it as follows, although it did not bear his name as such at the time:

> *Let us look at the matter in detail. When we say that a body K alters its direction and velocity solely through the influence of another body K', we have asserted a conception that it is impossible to come at unless other bodies A, B, C . . . . are present with reference to which the motion of the body K has been estimated. In reality, therefore, we are simply cognisant of a relation of the body K to A, B, C . . . If now we suddenly neglect A, B, C. . . . and attempt to speak of the deportment of the body K in absolute*

space, we implicate ourselves in a twofold error. In the first place, we cannot know how K would act in the absence of A, B, C . . . . ; and in the second place, every means would be wanting of forming a judgment of the behaviour of K and of putting to the test what we had predicated, which latter therefore would be bereft of all scientific significance. ...The motion of a body K can only be estimated by reference to other bodies A, B, C . . . . But since we always have at our disposal a sufficient number of bodies, that are as respects each other relatively fixed, or only slowly change their positions, we are, in such reference, restricted to no one definite body and can alternately leave out of account now this one and now that one. In this way the conviction arose that these bodies are indifferent generally...When we reflect that we cannot abolish the isolated bodies A, B, C . . . ., that is, cannot determine by experiment whether the part they play is fundamental or collateral, that hitherto they have been the sole and only competent means of the orientation of motions and of the description of mechanical facts, it will be found expedient provisionally to regard all motions as determined by these bodies. [1]

The essence of this principle is that a certain property associated with mass is actually thought to be determined by the total mass of the universe. The fact such knowledge does not prevent local measurement, and can be ignored without risk, does not mean that background is insignificant. The following example has been used many times to exemplify this: we tend to think of the curve of water in a container that is rotating to be caused by centrifugal forces. It may not appear to be a serious, even a scientific question to ask at first, but nonetheless it is one that has caused some interesting speculative thought in science: how does the water know it is spinning? The reason this is an interesting question is simply that modern theories have more or less dispensed with the notion of absolute space, particularly where relativity is concerned, and so it cannot be curving in relation to that as a reference body. The problem is two-fold, and is explained in this passage from 'Was Einstein Right?' by Clifford M. Will, in relation to the curved surface of water in a spinning bucket:

If we truly abhor the concept of absolute space, as relativity in its Newtonian or Einsteinian forms teaches us, we cannot answer that the water knows that it is rotating relative to absolute, non-rotating space. With respect to what then? The best we can do is to answer that somehow the water knows that it is rotating relative to the distant stars and galaxies. [2]

There are two things to note here. Firstly, it is extremely unusual to find a scientist talking about natural objects as 'knowing' or 'somehow knowing'. In fact, that water 'somehow knows' about the existence of distant stars and galaxies is not only a non-scientific statement, it is exactly the kind of thinking that lies outside the purview of Kant's marker stones which fix the border of rational thought, as we shall see. (This will be considered shortly). But clearly, this is not a meaningless statement since even as an obscure perception, one should note a bond between any particular part and the whole, and the closest that science can get to it is to describe it as 'somehow knowing'. It is of interest to note, however, that Einstein was much taken by Mach's thoughts concerning the relation of the part to the whole, and indeed tried to incorporate it in his own theories, failing to do so nonetheless. But the issue does raise problems for science, however, for while it has a predilection for detail, hoping to build up a complete picture from them, the reality is that the complete picture actually gives meaning to the details, and Ernst Mach put it this way:

Nature does not begin with elements, as we are obliged to begin with them. It is certainly fortunate for us that we can, from time to time, turn aside our eyes from the overpowering unity of the All and allow them to rest on individual details. But we should not omit, ultimately to complete and correct our views by a thorough consideration of the things which for the time being we have left out of consideration. [3]

Clearly, it is possible to do science without a whole picture, but this is a statement that is held behind the view that, in actual fact, especially today, science believes it is capable of producing the whole picture, however illogical this may be. Science assumes too much for what it gleans from the bottom, since it conceives of a picture of the whole from these things, and never gives consideration to things that are left out and impede this process. What, then, are the things that are left out of consideration? Mostly, it is its very objectivity that excludes the person experimenting or thinking about science, as if incidental to requirements. Yet that incidental nature cannot be ignored as part of the whole for just the reasons given by Mach concerning the incidental presence of other objects that are necessary for measurement to be meaningful, though not essential for the actual measurement. Interestingly, Mach prefigures quantum theory by noting the importance of the experimenter in an unusual way. In a section with the subtitle 'Importance of an instinctive grasp of mechanical facts', he wrote:

We are ourselves a fragment of mechanics, and this fact profoundly modifies our mental life. No one will convince us that the consideration of mechanico-physiological processes, and of the feelings and instincts here involved, must be excluded from scientific mechanics. If we know principles like those - of the centre of gravity and of areas only in their abstract mathematical form, without having dealt with the palpable simple facts, which are at once their application and their source, we only half comprehend them, and shall scarcely recognise actual phenomena as examples of the theory. We are in a position like that of a person who is suddenly placed on a high tower but has not previously travelled in the district round about, and who therefore does not know how to interpret the objects he sees. [4]

The main thrust of this passage has been largely put to one side since Mach's time, but we should note here our interest since, properly performed, science makes real its ideas when they are palpably felt, and not merely known. Feeling is the essence of being, and yet it hardly appears in science as any kind of idea or concept. Is it just coincidence, therefore, that Mach, in citing the importance of a felt state, should also be the person who presents us with the closest science seems to have got to a microcosm, even though its scope is limited? More will be said about this later, but we should be able to see, nonetheless, that whatever we might understand by the microcosm, we can actually see that the structure of reality corresponds to it in a way that is quite novel and relevant to the current state of science.

But of course, it is only a partial correspondence, since unlike the concept of microcosm dealt with at the beginning where it is the weight of things that creates the links, Mach's principle inevitably bows to the supremacy of the underlying principle of inertia, producing universal inertia as the macrocosm. There is nothing that can correspond to inertia, however, since it is designed to exclude a real reference point from the outset, and it is its inclusion that we will see operating in relativity, and which casts the longest shadow over its status of realism. However, because all our concepts are entrenched in its validity, it is extremely difficult to not see it as a truth. Validity is a condition of logic, while truth is empirical. Yet despite that, there has never been found any state that is truly inert in the whole of the universe, so science should always have narrowed its scope to instrumentality. Instead, all scientific concepts carry the DNA of inertia as part of their conceptual form, the effect of which are concepts and ideas, simply because they are expressed, and these are deemed to have realism attached to them for no better reason than a perverse ontological argument.

Space-time: real or illusion?

What is spacetime? That is to say, is spacetime a real thing?

In some respects, this is an immensely difficult question to answer because the weight of opinion, formed by a kind of outward consensus, compels an affirmative answer as though it were foolish to think otherwise. As we shall see, there are grave doubts concerning this whole topic, but it should be emphasised that the aim here is not to become embroiled too deeply within the mathematical and conceptual complexities of this subject, but to bring to the surface how it is that many things that may have no real existence nonetheless adopt the status of a real thing.

Spacetime began as a kind of non-Euclidean geometry describing large structures for which Euclidean geometry was not suited. But in the course of a very short period of time, the idea began to dawn that far from being simply a convenient qualitative description, spacetime became the fabric and mechanism missing in Newton which his laws of motion referenced in a descriptive way, without ever stating what it was they were describing. In other words, while Newton describes the acceleration of things via a formula with great precision, there was no mechanism in place that the formula actually described. But once Einstein's ideas became extant and subject to experimentation, there emerged the idea that perhaps spacetime is not simply a geometry, but an actual fabric that is the substance of gravity. Note what is being said here, that 'there emerged an idea'. This idea was that gravity and spacetime are one and the same thing. This is how Lee Smolin describes this:

> *The geometry of space is like a flat, infinite plane. It is like the surface of the ocean-incredibly dynamic, with great waves and small ripples in it...But Einstein's equivalence principle tells us that the effects of gravity cannot be distinguished, over small distances, from the effects of acceleration. Hence by telling which trajectories are accelerated and which are not, the geometry of spacetime is therefore the gravitational field.* 5

Geometry is 'like' a plane, it is 'like' the surface of the ocean. Being 'like' something is one thing, but it is a huge leap of faith from 'like' to 'is', and this is precisely what has happened: the geometry of spacetime 'is' the gravitational field. It is an odd thing to note that in the spiritual tradition, similitude leads connections to similar real things from correspondences or 'likenesses', (when spiritual things correspond to natural things) but since we are speaking from science, 'like' is not the same as 'is'. Despite this, similitude has become the mainstay of scientific thought: if reality matches the model, then the model is real. In science, this likeness has become a powerful persuader. If it looks, walks, squawks like a duck, then it is a duck, and this is how spacetime became a real thing. Consider the following passage, and note the absolute lack of doubt concerning the status of realism, such that spacetime is considered as a real fabric:

> *Since we speak of the 'fabric' of spacetime, the suggestion goes, maybe spacetime is stitched out of strings much as a shirt is stitched out of thread.* [6]

This was published in 2004, and confirms how entrenched we have now become in thinking of spacetime as a real thing, indeed as the apparatus of the gravity field. However, even though the principles of similitude are clearly highly motivational in establishing a state of realism, this really is not enough from a scientific perspective to make the case cast iron. If it is a real thing, then it must be possible to detect it. Has this happened?

One of the consequences of relativity is that light grazing past the surface of the sun should be deflected by a small amount as a result of the bending power of gravitation near such an object, which is effectively the same thing as an intensification of spacetime curvature. Without going into details, photographs were taken during an eclipse of stars whose light was made visible in the darkness and sure enough, certain stars were not in the same position as seen in the night sky as their light passed close to the surface of the sun. It is difficult to explain the huge influence of this experiment in 1919. Prior to this, relativity was an interesting, theoretical model that hardly anybody understood, but the implications of this experiment were so resounding that it was headline news all over the world, and everybody suddenly got interested in this new theory, even though only a handful of people actually understood it. Even so, it became the talking point of the decade and pivoted its founder to superstar status. Sir Arthur Eddington, the scientist who carried out the experiment, subsequently wrote a book which is largely academic, in which he explains the new views in relativity from a mathematical and conceptual point of view, but then goes to much trouble in giving the details of the expedition for these reasons:

> *It is not the general purpose of this book to enter into details of experiments; and if we followed this plan consistently, we should...summarise the results of the observations in a few lines. But it is this particular test which has turned public attention towards the relativity theory, and there appears to be widespread desire for information. We shall therefore tell the story of the eclipse expeditions in some detail.* [7]

It is difficult to understand the impact of an experiment like this, since we live in an age that has inherited its impact in a way that has become matter-of-fact over time. However, the impact was not only in terms of worldwide publication. This experiment was the incentive that led to Karl Popper becoming the leading philosopher of science, and who established the crucial test as a way of determining scientific realism as the only true reality. His interest had been concerned with psychology initially, and he was perplexed by the fact that different theories of mind, while mutually exclusive, could all nonetheless be verified, and constantly verified with every new case they were applied to. But then he heard about Eddington's observation of the eclipse and everything changed:

There was a lot of popular nonsense talked about these theories, and especially about relativity (as still happens even today), but I was fortunate in those who introduced me to the study of this theory. We all, the small circle of students to which I belonged – were thrilled with the result of Eddington's eclipse observations which in 1919 brought the first important confirmation of Einstein's theory of gravitation. It was a great experience for us, and one which had a lasting influence on my intellectual development. [8]

That influence led to the principle of falsification and the crucial test that became the mainstay of scientific method, and this because light truly was bent by the sun. It could not possibly be an ambiguous conclusion. Even Eddington dismissed any other kind of explanation:

It is suggested that it may not be an essential effect of the sun as a massive body, but an accidental effect owing to the circumstance that the sun is surrounded by a corona which acts as a refracting atmosphere. It would be a strange coincidence if this atmosphere imitated the theoretical law in the exact quantitative way...and the suggestion appears to us far-fetched. [9]

As far-fetched as it may have been back in 1919, measurement techniques and telescopes have improved by many magnitudes in the intervening years, as has knowledge of the sun's structure. Part of this structure concerns the surface of the sun which is composed of plasma, a substance unknown of at the time the experiments took place. An important feature of this plasma is that it is both very hot and ionising, which means that light passing through it is altered in its direction. A YouTube video featuring a lecture by Dr Ed Dowdye entitled 'Solar Gravitation and Solar Plasma Wave Propagation on Interaction', Dr Dowdye argues a case that actually answers Eddington: yes, it is a strange coincidence, because investigation now shows that light bends near the sun if it is within the plasma limb. Three key statements are made:

1) The plasma limb of the sun acts directly on the electromagnetic waves propagating along a minimum-energy or a least time path within the plasma limb as would be defined by the gravitational gradient field of the sun.
2) The gravitational gradient field of the sun acts only indirectly on the electromagnetic waves that are being deflected by the plasma limb.
3) All electromagnetic waves propagating in the plasma-free vacuum space appear to be unaffected by the gravitational gradient field of the sun and of the stars.

These three statements are the result of many observations, but the implications for relativity are profound. Light certainly bends in the plasma rim of the sun, and should also bend at various distances from the sun by smaller degrees. They do not do so, and as Dr Dowdye put it, this is bad news for relativity. Light rays follow Gauss' law and not Einstein's law. It seems, therefore, that the eclipse did not provide Popper with the crucial test, and Eddington was too confident in his views. Now this is not intended as a scientific critique. Keep in mind that the question with which we began was 'Is spacetime a real thing?' there is plenty of evidence today to say that this is not the case. For those interested in pursuing this further, the link to this video is given.

https://www.youtube.com/watch?v=CnvOybT2WwU&index=12&list=PLTelNRf8MIXXlw-fAiNHlJQpcUeDe1TAH

Notice this: this criticism is not mine but has come from science itself. In other words, there seem to be two factions in the scientific community, and Dr Dowdye is no lone voice. Secondly, any reference to spacetime is automatically a reference to the gravitational field so that doubt about the one as a real thing is doubt about the other. Indeed, a Machian perspective (albeit blurred by inertia), nonetheless throws doubt on both. Despite that, scientists cleave to the reality of it:

> *Many physicists tried to prove that the supposed waves in space amounted to a misinterpretation of the mathematics of general relativity. But in due course, the theoretical analyses converged on the correct conclusion: gravitational waves are real, and space can ripple.* 10

Consequently, scientists over the last twenty years have been searching for these with LIGOs (Laser interferometer gravitational wave observatories). Despite the long search, none have been detected. And yet this does not deter the spirit of confidence in the reality of these waves, even though their existence is entirely derived from the principle of inertia which has no correspondence with anything at all other than a preferred psychological position of preference. Furthermore, because mass has the effect of reputedly curving spacetime, there is an effect called frame-dragging in which a spinning object alters the spacetime fabric by causing it to be dragged by the rotation. This, too, presented science with an opportunity to perform an experiment that could detect it. Brian Greene describes the experiment, which uses precisely engineered gyroscopes which are sent into space:

1. *Four decades of development and nearly a hundred doctoral dissertations later, a Stanford team...is ready to give the experiment a go...If the experiment is successful, it will be one of the most precise confirmations of general relativity, and will provide the first direct evidence of a Machian effect.* 11

This evidence was not found, and the experiment cancelled. Perhaps it is easier to let science speak for itself here, for there are many who have written on these constant failures, but it is the mainstream voices only that we usually hear, since these are instrumental in raising the funding for these expensive experiments, and this does not go unnoticed, even in the scientific community:

> *No amount of experiment can prove a theory, but it only takes one experiment to falsify a theory. LIGO's international counterparts have also failed to detect the alleged gravitational waves. We have however seen that they are destined to detect nothing, being as they are, founded on false theory. LIGO alone has cost hundreds of millions of dollars to date, and it was recently granted another $450million US to continue its unaccountable extravagance. It is alleged that general relativity predicts that a rotating body such as the Earth, drags spacetime around with it. This is called 'frame dragging' or the 'Lense-Thirring effect'. The Gravity Probe B was launched into Earth orbit to detect this alleged effect. It did not detect the effect, despite exceedingly high precision gyroscopes designed for the purpose. In fact, NASA has cancelled the project...Gravity Probe B cost the taxpayer in excess of $750million US...Interests other than science, physics and astronomy in particular, is very big business. Interests other than science consequently hold sway over what is and what is not published in science journals and otherwise reported, what is taught to students at universities and high schools, and what research money goes where.* 12

Here, in this example concerning relativity, we discover that the persuasiveness of science, with respect to the original Eddington observations of 1919, were somewhat miraculous in their effect, and one should be wary of miracles, since they blur the edge of critical thought and narrow the vision. On the other hand, the current observations of Dr Dowdye effectively remove that persuasiveness by throwing doubt on the status of existence of spacetime, that it probably has no existence.

Bear in mind, however, that the doubts that have been put in place here are not intended to discredit science, but to create a certain intellectual softening, in order to investigate the conceptual forms behind relativity with a certain openness that has long since disappeared from the pedigree of science. The history of adherence to a particular view, especially when it has become so well established that it has become part of mainstream education, makes it extremely difficult to call to task cherished - or rather ideas that become cherished - even when it becomes clear that they are inadequate and flawed. It is often agreed that a spirit of critical openness is an essential ingredient of scientific thought, but when it comes down to practice, this is assumed to be incorporated in actual experimentation, and this has been a huge error of judgement. The effect has been to see those searching for this kind of view, or whose experiments conflict with received opinion, to be treated with a certain aggression. Even so, the calling to task of ideas is a prime essential if there is to be any progress in understanding the nature of reality, especially when opposed by those who feel their own interests attacked by it.

The Gravitational Field: its Origins.

The heart of general relativity is the local equivalence principle. This is not so difficult to understand once it is known what it is intended to explain. In fact, that explanation has already been given in part, which is that all things fall at the same rate because all things represent themselves as microcosms whose comparative differences are negligible. This will be explored momentarily. Science, however, has an entirely different answer, and one should see that this is because ultimately, any answer that is offered as explanation automatically incorporates a belief in its assumptions, and especially the assumption of inertia. Despite the modernity of relativity in comparison to traditional Newtonian science, it nonetheless adopts the basic assumption of inertia that drives the laws of motion, though it is not apparent.

Mention was made earlier of Kant and marker stones. Immanuel Kant is probably best known for ‘The Critique of Pure Reason’. However, he cut his teeth on a smaller work prior to becoming the evangelist of the Enlightenment movement in a book entitled ‘Dreams of a Spirit Seer’. On the surface, it follows a well worn political ploy; in order to establish himself as the Enlightenment’s champion, Kant picks on a well-known name in his own time and proceeds to diminish his stature as a thinker. The person in question was Emanuel Swedenborg, and the fact that he succeeded in his enterprise is evidence enough since no-one subsequently reads, studies, or has even heard of him. From the perspective of the Enlightenment, Swedenborg raised objections to the principle of inertia, and since this was the founding stone of the Enlightenment in many ways, Kant took it upon himself to discredit him. In so doing, however, he outlines the philosophical temperament that has dominated science since then, carefully defining the scope of its concerns:

...eventually science arrives at the determination of the limits set for it by the nature of human reason...The boundaries [of philosophy] draw closer together and marker stones are laid that never again allow investigation to wander beyond its proper limits... 13

It should be said that there is little, if any, real analysis of the psychology of human reason in Kant, yet the kind of reason of which he speaks is exclusively scientific to the exclusion of everything else:

Before we were wandering like Democritus in empty space, where the butterfly-wings of metaphysics had lifted us, and conversing with spirit forms. Now that the styptic power of self-knowledge has folded these silken wings, we see ourselves back on the low ground of experience and common sense, happy if we regard it as our assigned place from which we may never depart with impunity and which contains everything that can satisfy us, so long as we stay with what is useful. 14

The word for butterfly in the original Greek was Psyche, so notice what Kant is trying to do here psychologically. The use of the word 'styptic' is significant here, since it is the re-enfolding of wings. If the cocoon of the mind was ever to develop into something more significant, here we see it having its wings clipped and assigned to dwelling within the limits imposed by this kind of thought. And it was Kant who championed this movement that is still with us today. In other words, we are to rest satisfied with an etiolated reality.

When we consider that Kant set up the marker stones that put styptic knowledge in place, one should note that Einstein subscribed to the views this way of thinking encouraged, and sets out this belief in his book which explains relativity:

Why is it necessary to drag down from the Olympian fields of Plato the fundamental ideas of thought in natural science, and to attempt to reveal their earthly lineage? Answer: In order to free these ideas from the taboo attached to them, and thus to achieve greater freedom in the formation of ideas and concepts. 15

In its meaning, this is very similar to Kant's statement in opposition to Swedenborg in delineating the rational programme. The styptic power, in Einstein's case, is to assume that nothing but knowledge with an earthly lineage can be considered as knowledge. But 'an earthly lineage' is taken to new extremes, in that every bit of any kind of human element must be removed in order to get to the 'real' picture, something that Mach whom Einstein admired had already argued against. The concept of space itself, central to his thesis, must become more mathematical and freed from any sense of material which has become psychologically attached:

All these space-like concepts already belong to pre-scientific thought, along with concepts like pain, goal, purpose, etc. from the field of psychology. 16

Notice the attitude, that an ends-related conception of causality is simply rejected out of hand since it is 'psychology' and also 'pre-scientific'. It is then that he strips away everything from reality in order to be left with the pure abstraction which eventually becomes the mathematical model:

Now it is characteristic of thought in physics, as of thought in natural science generally, that it endeavours in principle to make do with 'space-like' concepts alone, and strives to express with their aid all relations having the form of laws. The physicist seeks to reduce colours and tones to vibrations, the physiologist thought and pain to nerve processes, in such a way that the psychical element as such is eliminated from the causal nexus of existence, and thus nowhere occurs as an independent link in the causal association. Relativity...Page 141

From the current perspective, this is saying that all of reality will reflect only the purely rational conceptions of thought that are removed as far as possible from anything human in order to guarantee that what is derived from it contains nothing of any kind of ends-related view of reality, and in many ways this implies the microcosm in the form already mentioned. Since this is Einstein's base position, it may now seem pertinent to restate the original question here: Is spacetime a real thing? Indeed, is the gravitational field a real thing since it is seen as a synonym for it? This is the question that needs now to be explored. However, bear in mind the advantage presented by the concept of the microcosm over Mach's principle, an advantage that has yet to be fully outlined. It is this that ultimately provides the means of analysis of these concepts, and brings relativity within the range of human experience.

The concept of the gravitational field is derived from a principle of analogy. It may be that most people think of it as a 'real' force, in that we are accustomed to think of changes in terms of forces, but this has more to do with tradition and education than with any evidence in support of the concept. The first thing for Einstein is to remove the sense of psychological input from the word 'attraction' for reasons just given. In this regard, he begins by discussing gravity by comparing it to electromagnetism:

'If we pick up a stone and then let it go, why does it fall to the ground?' The usual answer to this question is: 'Because it is attracted to the earth.' Modern physics formulates the answer rather differently for the following reason. As a result of the more careful study of electromagnetic phenomena, we have come to regard action at a distance as a process impossible without the intervention of some intermediary medium...We are constrained to imagine – after the manner of Faraday – that the magnet always calls into being something physically real in the space around it, that something being what we call a 'magnetic field'. [16]

The aim here is not to discuss electromagnetism but gravity. The force of gravity, however, is connected to it in that its form is inspired by this statement about electromagnetism, so it is important to consider what is being stated here. As just mentioned, given the predilection for non-emotive language, which a word like 'attraction' might suggest, matter (in this case, a magnet) 'calls into being' a field. But what exactly does this 'calling into being' mean or entail? In some ways, this is closer to subjectivity than what is normally associated with it, a kind of ontological naturalism which is 'physically real'. But in general, this kind of metaphysical definition is overlooked since the ensuing existent 'the field' lends itself to measurement, and it is that quality that is the reality for science, as though the 'calling into being' can be safely ignored. In fact it is ignored, and Einstein put it this way:

This magnetic field operates on the piece of iron, so that the latter strives to move towards the magnet. We shall not discuss here the justification for this incidental concept, which is indeed a somewhat arbitrary one. We shall only mention that with its aid electromagnetic phenomena can be theoretically represented much more satisfactorily than without it. 16

Of course, there is no justification, and that is why it is outside the realm of scientific discussion, but this does not matter, for the incidental conception provides a framework of measurement, even though what it measures is somehow 'striving'. Is not 'striving' a word more at home in psychology than anything defined as science? We should be alerted by this habit of operation, since what concerns us here is how an idea is made 'real'. The technical word for this process of making something real is 'reification', and it is clear that while 'striving' may have 'called into being' a field, these elements that are apparently human are then discarded once the field is made real. While this is rarely mentioned, even so a lot of thought has developed since Einstein's day, and there are now, even among scientists, doubts about the status of being of these kinds of reified objects.

As recently as the end of the 20th century, a paper written jointly by Professors Jeremy Butterfield and Chris Isham of Imperial College entitled 'Spacetime and the Philosophical Challenge of Quantum Gravity' made the following assertion:

…philosophers of physics do in fact tend to endorse realist accounts of reference and truth. We suspect that the main cause of this is the powerful psychological tendency to take there to be real physical objects, corresponding to their properties and relations to the mathematical objects in mathematical models, especially when those models are very successful… The main example of this psychological urge will be the tendency to reify spacetime points…17

But to return to the point, it should be stressed that these are not serious considerations with respect to electromagnetism, though it should be borne in mind. It becomes a problem, however, when the successes in one area of field theory become an analogue or extension into areas that do not comply in the same way. This is the danger of reification, as suspected in the article just cited, for it is at this point that the concept of field is then applied to an area of reality - the concept of gravity – purely in terms of similitude.

This becomes an issue once the discussion on gravity gets under way, and Einstein immediately sets this habit of thought to work:

The effects of gravitation also are regarded in an analogous manner. 18

Straightaway analogy is invoked, only this time an idea becomes reified, or made real, for no more reason than this, that it had produced results before with respect to electromagnetism. Couple this with the fact that it was no longer possible to conceive of action at a distance without an intermediary called a field, then this became the compelling argument. There is no evidence for the view, but it is hardly possible to express the power and the intellectual seduction that such thoughts can have, which is what is meant by a powerful seductive tendency in the quotation just cited. They help to put even greater confidence in place for the styptic model. That is to say, another field is 'called into being', only this one does so as it was useful in a completely different domain, that of electromagnetism:

> *The earth produces in its vicinity a gravitational field, which acts on the stone and produces its motion of fall.* 19

But does it? It is like a field and at the same time it is not like a field. That is, it is given characteristics that are not field characteristics which present us with a conception that is mass-dependent and at the same time mass-free. The electromagnetic field has both attractive and repulsive characteristics, but the gravitational field does not. How can it be both at the same time? 'The earth produces a field', but how does it do this and why? Indeed, is it possible to prove it? The fact remains that to date, these ideas are still largely metaphysical and speculative, and any evidence in their favour has been discredited. The details need further analysis, particularly since our beliefs in gravity as a force or field have more to do with habit than analysis.

Microcosmic detail

Take two weights of 50 grams and 100 grams; is there something to be said about them that is unavailable to the traditional scientific view? If we consider these weights in isolated form as we are inclined to do, we think of them as though one is twice as heavy as the other. This is as far as we have become inclined to know about the application of fractions and ratios. But in true isolation, that difference is far more significant. In the absence of the universe, they are the universe, and so the difference is enormous. Why this is the case will be shown shortly. But in the presence of the universe, the difference is negligible. This also highlights the difference between Mach's use of the word 'incidental' and Einstein's. The incidental is a context that cannot be left out which provides the frame of reference for measurement. For Einstein, however, it is, to all intents and purposes, irrelevant. Consequently, when he sets up his thought experiment, he pursues the context of a Galilean frame of reference and sets up his experiment in such a way that he imagines that something meaningful can be derived from it, when in fact the experimental context is impossible. It is akin to imagining that the context of the experiment is the whole of reality and at the same time unchanging, thereby conforming to the principle of inertia.

So let us make the difference between the weights even more extreme, say an ounce and a ton. This difference is then over 2000 to 1 in terms of ratio. Yet still, in comparison to the universe these are negligible degrees of difference. But suppose these weights were the sum of everything that exists, then at that point we might see the ounce attracted towards the ton. But at what rate it is not possible to guess for the reasons given by Mach, that one requires a background A, B, C... etc. Still, it is clear that the individual separate object would behave differently in the presence of the universe from the same object in its absence. But even more significant, how are we to consider the nature of the ounce/ton partnership in the presence of the universe when that universe is removed? At such a point, one thing is logically clear, which is that instead of being fractions (ie one over many) they would in fact be the all of everything. Try to imagine the density of such a mass at such a point, and we have before us the rudimentary form of a Big Bang explosion, since such a weight would be unsustainable for any length of time, whatever that might mean in this context. At any rate, it most certainly would not be inert and there would be a significant event. What the effect on two objects would be is unguessable, but it is unlikely that they would behave in the same manner as in the presence of the universe.

It is the presence of the universe that gives each object its fractional form, and it is that form that makes their difference negligible. Given that negligible difference between them, they would both be overpowered and be attracted to a larger object such as the earth rather than towards each other. Even so, there would exist an attraction between them but it would no doubt be immeasurable. This emphasis on negligible difference is extremely relevant, since it means that we should expect to see them both falling at the same rate, which is precisely what happens.

There are two conclusions that follow from this. The first of these is that whatever we might mean by the universe, the part knowing itself as fraction must therefore have the whole inscribed on it. It is like any person who carries the genetic structure of their forbears. No individual is the whole, but as part of the whole they mirror in themselves something of the history of their physical form. However, this is not an oppressive weight so much as the form of individuality as a separate entity that springs from the whole. If we should consider a quantum state of particularity here, we can begin to see how that notion of imprinted wholeness defines the non-interactive which collapses into individuality in an interaction. No one thing, however small, is ever a single thing, but a complex that either references the universe from which it has sprung, or has the potential of becoming one since as a whole it could actualise that potential. But it would take the disappearance of the whole universe to make that happen. That is to say, any one thing may be an ounce, a ton or hundreds of tons, yet each thing could quite easily be the point of 'infinite density etc' that could give rise to a universe. (Clearly, this has implications for the current views on the Big Bang, as well as interpretations of the quantum state, but these are not the point of interest here, so it is left for the time being.) It is enough to note that this kind of idea is available and open to knowing, but entirely hidden from view in what we currently understand by 'knowing'. In other words, even before we consider reality in these terms, it is clear that the mind so doing needs to see itself as a similar form of microcosm, and not as the limited understanding that imposes its own strictures through adopting stypticism as its prescribed choice. Up till now, we have had to be satisfied with the best science could offer in this view as 'somehow knowing'. But if we perceive from the fractional view of microcosmic thinking that every bit is constantly in the process of re-evaluating the universe and one's relation to it, this is not so much 'somehow knowing' but 'microcosmic knowing'. Furthermore, given the analogy above, microcosmic knowing is akin to a feeling state. This is far more suited to understanding reality since we not only become more centred with respect to the universe, but it provides a means for applying thought to reality in a novel way, as will be seen shortly.

The second point of interest, however, directly concerns the principle of inertia. This principle states that a state of nothing-happening is what one can expect to find where no forces are at work. On the contrary, any state of nothing-happening is actually a constant re-evaluation of the presence of the universe. The appearance that nothing is happening is therefore more accurately described as something constantly happening and readjusting. All the while, this state of not-changing is actually the most active state since it is determined by a constant re-evaluation of the state of the whole in order to maintain its own equilibrium which only appears to be inert. Nothing actually corresponds to inertia. The same cannot be said for the microcosmic view, since the microcosm, which is any part, no matter how small, is constantly reflecting the whole. This may surprise the purely rational scientist, but no mystery to the intuition of art practice, or poetic expression, as in these lines from T. S. Eliot's 'Four Quartets', in 'East Coker':

There is, it seems to us,
At best, only a limited value
In the knowledge derived from experience.
The knowledge imposes a pattern, and falsifies,
For the pattern is new in every moment
And every moment is a new and shocking
Valuation of all we have been. We are only undeceived
Of that which, deceiving, could no longer harm.

Equivalence Principle

Keep in mind the following, that the microcosm shows that the difference between two masses of different weight is negligible, and that for this reason they fall at the same rate. For Einstein, the same effect occurs but for an entirely different reason. Having postulated the gravitational field, he immediately explains that it is not like the field that inspired the conception:

> *In contrast to electric and magnetic fields, the gravitational field exhibits a most remarkable property, which is of fundamental importance for what follows. Bodies which are moving under the sole influence of a gravitational field receive an acceleration, which does not in the least depend either on the material or on the physical state of the body.* 20

So it is not like a true field. How, then, is one to explain the rate of fall? It is by appeal to Newtonianism:

According to Newton's law of motion, we have:
(Force) = (inertial mass) x (acceleration),
where the 'inertial mass' is a characteristic constant of the accelerated body.
If now gravitation is the cause of the acceleration, we then have,
(Force) = (gravitational mass) x (intensity of the gravitational field),
where the 'gravitational mass' is likewise a characteristic constant for the body.

From these two relations follows:

(acceleration) = (gravitational mass) x (intensity of the gravitational field)., (inertial mass) 20

The mathematics can be ignored here, for it is the conclusion that is drawn from it that is significant:

> *If now, as we find from experience, the acceleration is to be independent of the nature and the condition of the body and always the same for a given gravitational field, then the ratio of the gravitational to the inertial mass must likewise be the same for all bodies. By a suitable choice of units we can thus make the ratio equal to unity. We then have the following law:* ***the gravitational mass of a body is equal to its inertial mass.*** (My emphasis) [20]

The influence of this statement cannot be overemphasised. From the perspective of the microcosm, what this is saying is this: Why do different things fall at the same rate? Certainly not because of the microcosm, since this is an inertia-free conception. Rather, it is virtually a mathematical principle of cancellation. The acceleration of a body and the inertia of a body, (since one is the numerator and the other the denominator) cancel out by the arbitrary choice of suitable units. In this way, the gravitational field becomes an independent entity and therefore a real thing, even though there can be no gravitational influence without a body. But because the equivalence principle that is inherently microcosmic has the same effect as Einstein's version of the same, credence is given to the latter because it maintains belief in inertia, and thereby continues to promote the philosophy of stypticism. In short, there is no scientific basis for this view. (Just as a reminder here, styptic knowledge is caterpillar thinking opposing the evolution of the butterfly, which is a different mix of thought and the felt state.) It is effectively a principle designed to fit the facts after the event, but which cannot account for those facts. Again, we should note that because there are here two forms of equivalence, that in itself speaks volumes concerning the ambiguity of knowledge that is informed by the predilections and bias of the mind-set, and Einstein's is clearly the same as Kant's as shown above. Furthermore, we should not imagine that Einstein's view is comprehensive in its scope since the arbitrary choice of units still leaves his explanation looking like a designed coincidence, in order to support the reified gravitational field. In his dictionary of science, 'Q is for Quantum', John Gribbin supplies a definition of gravitational mass, and we should note the implications of the last statement:

> ***Gravitational mass:*** *A measure of the amount of matter in a body, determined by its gravitational force. The force of attraction F between two bodies with gravitational masses m and M separated by a distance r is given by the equation $F = GMm/r^2$, where G is the gravitational constant. The gravitational mass of an object is exactly equal to its inertial mass; this is a deep truth about the way the Universe works, but nobody can explain it.* [21]

This is stated here in order to show how little of what we know is actually really understood. It cannot be explained because there is no explanation, and for good reason: it is a reification, and has no real existence. However, since this has been a conceptual study, it may not yet be clear what is at stake. Fortunately, this is also an attitude shared by Einstein, and he provided an interesting thought experiment which is much more accessible, and so he outlines this next. It is in this that the restrictions to thought become more visible.

Thought Experiment

We imagine a large portion of empty space, so far removed from stars and other appreciable masses that we have before us approximately the conditions required by the fundamental law of Galilei. It is then possible to choose a Galileian reference-body for this part of space (world), relative to which points at rest remain at rest and points in motion continue permanently in uniform rectilinear motion. 22

We should note to begin with that we are presented here with an ideal state, a state that, according to Mach, is meaningless since being 'far removed' amounts to trying to imagine a universe without matter, since it has no influence, as well as presenting the inertia principle as though it were fundamental and could apply in this state. This, in effect, is the background for the experiment that Einstein is about to propose. It begins with an ideal candidate placed in this context:

> *As reference-body let us imagine a spacious chest resembling a room with an observer inside equipped with apparatus. Gravitation naturally does not exist for this observer. He must fasten himself with strings to the floor, otherwise the slightest impact against the floor will cause him to rise slowly towards the ceiling of the room.* 22

Here, then, are the two conditions which are posited for this thought experiment, a region of space so far removed from anything else that the whole universe can be deemed non-existent, and therefore without fields to influence it. The second condition is the room, a particular but unspecified mass floating in it, containing equipment and occupant who clearly shape no field by their presence. It is effectively a situation that may have existed just after an alleged Big Bang perhaps, but this is doctored in such a way in order to conform to Newtonianism, that is, with the laws of motion which assume the principle of inertia as a starting point, and which are assumed to hold in such remote conditions when they clearly cannot.

But now it is necessary to make it possible, and it is here that Einstein inserts a condition which is overlooked, and has been overlooked, since the inception of general relativity:

> *To the middle of the lid of the chest is fixed externally a hook with rope attached, and now a 'being' <u>(what kind of a being is immaterial to us)</u> begins pulling at this with a constant force. The chest, together with the observer then begin to move 'upwards' with a uniformly accelerated motion.* 22

Here is the problem: the experiment cannot possibly work in these conditions because whatever causes the acceleration is absolutely impervious to any changes that occur in the mass being accelerated. This is the crucial point here, for it is at the heart of the local equivalence that Einstein establishes, from which many exotic reified objects eventually emerge (such as black holes, dark matter etc.), so it is worthwhile to look at this in more detail.

It is usual for writers on relativity, when reaching this point, to communicate the same idea by referring to rockets, as in the following example, again from John Gribbin's scientific dictionary:

...the equivalence is best described in terms of a spaceship being accelerated through space by constant firing of its rocket motors...In principle, when the motors are firing, the acceleration of the rocket could be adjusted so that everything inside felt a force exactly as strong as the force of gravity on earth (or any other strength you chose), pushing things to the back of the vehicle as it moved forward through space. Any scientific experiments carried out in this accelerating frame of reference...would give exactly the same results as if the spaceship were standing on its launch pad on earth, and not accelerating at all. 23

Without looking at the original, and referring to rockets, it is extremely difficult, in fact near impossible, to see how Einstein's lift has carefully steered the mind away from its basic flaw in order to arrive at the equivalence of acceleration and gravitation, indeed with the gravitational field and therefore the spacetime manifold that is assumed to be a real thing. That is to say, by ignoring the role of the accelerator, Einstein's lift is actually predisposed to its own conclusions. The rockets used by every writer on science since fail to recognise this restriction. Nonetheless, its presence is clear: *and now a 'being' (what kind of a being is immaterial to us) begins pulling...* In effect, Einstein puts a regulator in place to be impervious to any changes, and it is this that requires the being causing the acceleration to be 'immaterial to us'. The equivalent of this 'being' is a governor that can be found in any lift system, so that its speed can be the same for one person or several persons. It is this special type of accelerated system that is created in this thought experiment so that its experimental conclusions are guaranteed. That is to say, we are made to ignore the role of the accelerator in order to focus entirely upon what is happening in the lift without reference to an outside. Is it any wonder, therefore, that Einstein should come to this conclusion:

But how does the man in the chest regard the process? The acceleration of the chest will be transmitted to him by the reaction of the floor of the chest. He must therefore take up this pressure by means of his legs if he does not wish to be laid out full length on the floor. He is then standing in the chest in exactly the same way as anyone stands in a room of a house on the earth. 24

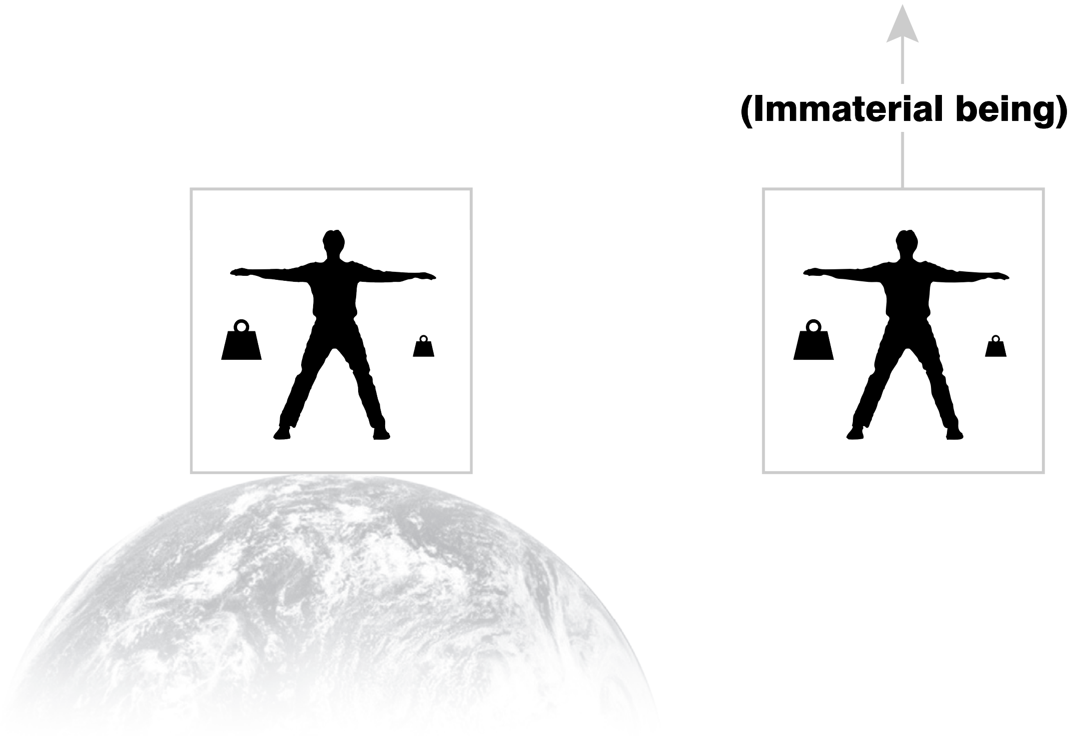
So far, so good. But now, since he has brought equipment, he performs an experiment:

1. *If he release a body which he previously had in his hand, the acceleration of the chest will no longer be transmitted to this body, and for this reason the body will approach the floor of the chest with an accelerated relative motion.* 24

Here is a rough sketch that expresses Einstein's position:

As it looks, it seems accurate enough, and most people will probably identify with this image as an experience one may have had in an actual lift. Two weights in this image are released and they fall to the floor. If the lift is on the planet surface, they will fall to the ground. If it is in space and accelerating away, they will again fall to the ground. The key point here is that the occupant of the lift cannot work out whether they fall to the ground because they are in one state (gravitating) as opposed to another (accelerating). This inability in a closed system is the heart of equivalence.

In fact, a more detailed illustration, showing both the accelerated lift and the gravitating lift, was cited in an article in Scientific American as long ago as 1980. (This particular citation is relevant for what follows.) A similar illustration is produced here, (but including a reference to the immaterial being pulling it) and below it is to be found this reading of it:



Classic elevator thought experiment, developed by Albert Einstein, demonstrates the strong equivalence principle: The effect of being at rest in a gravitational field (left) is the same as the effect of being at rest in an accelerated coordinate system (right). At the left, a man in an elevator in outer space experiences a real gravitational field due to a large mass that is near him, and so he feels himself pulled down toward the floor of the car. If he drops simultaneously a small mass and a large mass, they will fall with the same acceleration 'g' and therefore reach the floor at the same time. Now imagine instead that the gravitational field has been replaced by a rocket that pulls the elevator upward with a uniform acceleration 'g' (right). The man will still feel himself pulled down toward the floor of the elevator with the same force. When he releases the two masses, they will maintain a constant upward velocity, although the elevator floor is rising with acceleration 'g' to meet them. As a result they appear to be falling with acceleration 'g', as they did in the gravitational field. Therefore the man in the elevator cannot tell the difference between the situation at the left and the one at the right. 25

But now we see why this stronger form of equivalence was the desired conclusion, because, being in parenthesis, one tends to think that the accelerator is superfluous to requirements, but it is not. Basis physics taught in every school tells us the following: Suppose the weight of the lift and contents is given. Then the force applied to accelerate it and simulate gravity is a fixed one. That is to say, the force acting on the mass produces a clear acceleration, or :

$$F \longrightarrow M = A$$

Now imagine that the experimenter is standing on scales which show his weight under this acceleration. He may conclude, since it is a constant acceleration, that the weight reading is identical to someone on the earth. He now pulls a lever which releases a heavy weight from the ceiling which is half the weight of the whole system of lift, equipment and occupant. He will now notice that his weight on the scales doubles as the weight is in relative motion according to this formula:

$$F \longrightarrow M - M/2 = 2A$$

This clearly falsifies the equivalence principle, since he can now conclude with some confidence that he is not standing on the earth, but accelerating upwards. This is forbidden by the equivalence principle, and explains why the accelerator is ignored in the reaction, since it is only true where the lift is governed, so that the accelerator is superfluous, or it is extremely local, where the falling weights are tiny fractions of the whole that are virtually immeasurable. But this is not what Einstein is saying. He is so convinced of the equality of inertial and gravitational mass that he is hardly aware of this problem and actually universalises it beyond the local level where it could possibly be relevant:

> *The observer will further convince himself that the acceleration of the body towards the floor of the chest is always of the same magnitude, whatever kind of body he may happen to use for the experiment.* 26

Consider, therefore, how this entirely restrictive conclusion with respect to acceleration is forced into equivalence with gravitation. (It should be stated that by 'restrictive', the limited range of application is meant. That is to say, there is a range of application, but it is limited to the Newtonian scale):

> 2. *Relying on his knowledge of the gravitational field (as it was discussed in the preceding section)…* 26

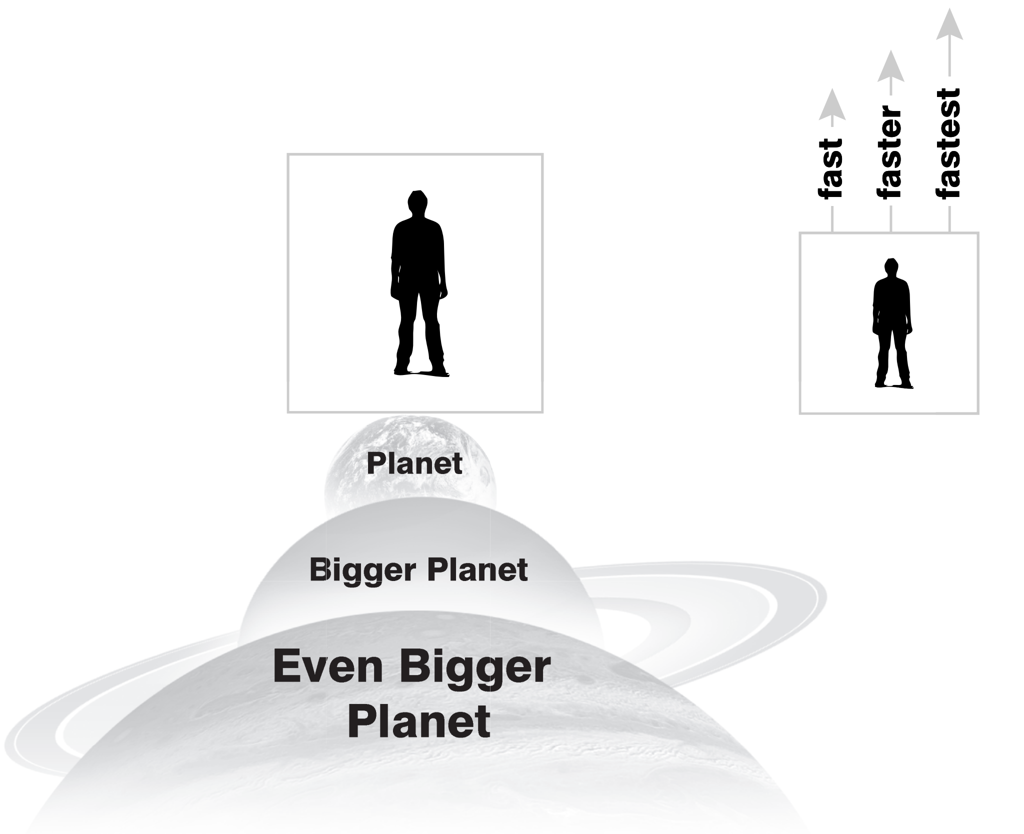
That knowledge, of course, is not so much established fact but belief, that gravitation is made into a real thing by analogy alone to the electromagnetic field. Belief suddenly becomes 'knowledge' and ultimately in this discussion into a 'law'. No evidence of any kind other than descriptive observation is relied on, as though the description was in itself prescriptive, and it is this habit and nothing more that has reified it. Consequently:

> *…the man in the chest will thus come to the conclusion that he and the chest are in a gravitational field which is constant with regard to time. …* 26

Let us put the case in a more concrete form: a man is pulling up a bucket of rocks using a rope. It is quite heavy, and so he is drawing them up slowly. Suddenly, the bottom of the bucket gives way, the rocks fall out, and the man experiences a sudden surge upward as the force he is applying is the same, but the bucket is now lighter. If we now transpose this effect to the accelerated lift, then because the lift is suddenly lighter as a result of releasing the masses, it will experience a sudden increase in acceleration which means that the weights released will reach the floor sooner in the elevator on the right compared with the elevator on the left. In fact, this seems so obvious, that one must ask why it was necessary to put the immaterial being into the picture and so rig the outcome. Clearly, the right hand lift cannot possibly behave in the same way, and yet every science book that has ever been written on the subject conveniently leaves out the matter of the immaterial being, even though basic physics teaches that this cannot be done. What is the deeper reason for this exclusion, for it is clearly not an oversight?

Revising Equivalence

It should not be assumed that this is an attack on relativity. Certainly, the form in which equivalence is presented is attacked, but this does not negate equivalence entirely, nor was that the intention. There are some common sense reasons for saying that the effects of gravitation are the same as the effects of acceleration. The example Einstein uses is the experience of a train accelerating or braking. When pushed to the back of a seat we can assume we are either accelerating or being pulled by gravitational effects, as if lying down. Consequently, there is something that appears to be intuitively correct about the lift experiment. However, this use of an immaterial being is clearly the result of adhering to an unquestioned assumption. In the process, we should note that we are now presented with two forms of equivalence that appear outwardly to be saying the same thing. Since scientific methodology is concerned mostly with that outward form, it needs to be shown how the microcosmic form of equivalence can be drawn from the same thought experiment, but one that is inclusive of the accelerator.



Firstly, notice that the arms of the occupants in both lifts are by their sides. This is to indicate that they are not performing any experiment. The reason for this is simply that the outcome would be the same as in the first experiment. Imagine that the occupant in the lift on the right drops a heavy weight. Such a lift would have to be suspended by a spring balance above the earth since the interest here is in mass and weight. Since the lift would be fractionally lighter, the spring would retract and the occupant would 'feel' heavier momentarily. If the occupant in the second lift dropped a weight, the lift would be accelerated somewhat and so the conclusion would be the same. No real advantage is gained, and this is because the closed box does not provide any access that can provide any.

The difference, however, is precisely the fact that they do not do experiments. So now imagine that while they are standing in their respective lifts, they experience a change. Imagine them standing on scales. On looking down they would note that their weight had increased. What can they actually deduce from this? The person on the right might assume that another rocket has been fired, or the being pulling on his lift was exerting more force. What about the person on the left, however? He might suppose that the gravitational field had strengthened, but what exactly could make that happen? The answer is simple: it is as if a great deal of mass were suddenly added to the earth, or indeed that somehow he had been transported to another, bigger planet. But you should also notice that the lift on the right is somewhat smaller than the lift on the left. This is to indicate the following, that the expenditure of a small amount of energy resulting in acceleration is actually equivalent to the addition of a great deal of mass beneath the other. This is not at all the same as saying that the effects of gravitation and the effects of acceleration are indistinguishable. The reason for this is that the effects of gravitation are the result of the presence of mass and cannot be separated from it. Furthermore, if the acceleration increases at a rate that exceeds the limit required to mimic earth's gravity, the equivalent is for even more mass to be added to the other. For traditional relativity, mass is superfluous since the notion of a gravitational field is conceived as an entirely geometric concept which does not refer to mass at all. The cancellation of gravitational and inertial mass guarantees this.

The implications of this difference are far more wide-reaching, but for the moment, we should consider that we are presented here with two entirely different viewpoints, one that is mass-dependent and the other mass-free. Despite this difference, they both agree with the outcome that all weights fall at the same rate. Which of these has the greater scope of perspective when describing reality? And is there a way to choose between them? (At the same time, keep in mind that there are two statements at the base of all this that are driving this investigation. The first is that there is nothing that corresponds to inertia, and the second, yet to be explored, is that gravitation is an inherent feature of mass, not a force acting on it externally. These two statements are incompatible with current relativity, and yet the system that we have inherited and which dominates in 21st century culture is one in which inertia is the basis of everything, and gravitation turned into a real thing. At base, therefore, this paper is effectively concerned with the question: what is the status of being of a real thing?)

There is, however, a way to choose between these two forms of equivalence. The description of the original lift experiment above was cited from the May 1980 edition of Scientific American. It appeared in an article by Daniel M. Greenberger and Albert W. Overhauser entitled 'The Role of Gravity in Quantum Theory'. These scientists had developed a method for magnifying events on a quantum level so that they could be seen, with the use of a device called a neutron interferometer. In effect they were able to test the effect of gravity on a neutron wave and thereby measure the range of its application down to the smallest part. The result showed that the equivalence principle applied right down to the quantum level. However, while this is a significant result, there was a fly in the ointment, and this was to do with the geometric form of equivalence, produced as we have seen by the cancellation of inertial and gravitational mass. It would be useful to remind ourselves here of the issue. The microcosmic equivalence relates the uniform rate of fall to the negligibility of differences in masses of different weight because they are expressed in fractional terms as parts of a whole. Traditional equivalence sees this uniformity with respect to falling masses to the cancellation of two forms of mass, and this in turn leads to a geometric form of equivalence in which mass plays no role. In microcosmic equivalence, the mass is crucial. Consequently, while the effect is the same, the cause is entirely different. It is this difference that the experiment cited in this article brought to the fore:

> *From the viewpoint of Einstein's theory a particle is said to obey the geodesic equation: the particle takes the 'shortest' path in the curved space-time. The geodesic equation replaces the classical law of inertia: free particles in flat space tend to travel in a straight line, which is of course the shortest path in flat space. Like Galileo's observation, Einstein's formulation speaks not of mass but of position and velocity. We can summarize this point by introducing the geometric weak equivalence principle, which holds classically. The principle states that there are no physical effects at all in an external gravitational field that depend on the mass of a point particle.* 27

The authors are explaining this geometric, mass-free equivalence at this point, because although their experiments confirm it, nonetheless this has more to do with coincidence than design. The reason for this is that their experiment requires that on the small scale, mass is included in their description of events:

> *Yet surprisingly it turns out that the COW experiment is incompatible with the geometrical equivalence principle because interference effects in quantum mechanics depend on the mass...The interference between matter waves, which is an essential part of quantum mechanics, is the phenomenon that underlies the neutron interferometer. Since the wavelength of a neutron depends on the momentum, which is equal to the mass times the velocity, it depends on the mass as well. This means that from the outset the mass is incorporated into the wave nature of the neutron. In other words, the importance in quantum mechanics not of velocity but of mass times velocity has deep theoretical roots as well as having been securely established by experiment...As a result quantum mechanics predicts that all phase-dependent phenomena, whether or not they are in a gravitational field, depend on the mass through the wavelength. This feature is intrinsic to quantum mechanics.* 27

What is interesting about this is that it is known that when there is a climb upwards from the quantum level to the relativistic level, (or more appropriately here, from the microcosmic to the macrocosmic level), there is a sense in which that which is particular retains something of its particularity in the large scale in the form of a statistical structure. This structure does not contradict the microcosmic since it emerges from it, but the form of relativity, in which gravity becomes pure geometry through the equivalence principle, is such a contradiction. The fact that it appears geometric is because, statistically, the mass becomes negligible on the large scale and has no bearing on the outcome. Even so, it may be negligible, but it does not evaporate away. Indeed, the article states:

It is only in taking the average values of the trajectory parameters that the mass drops out. 27

The interest here is that while the restrictions imposed by traditional equivalence (image1) are prominently featured here, the conclusions show that the quantum mechanical picture is perfectly in phase with microcosmic equivalence (image 2), an equivalence that can easily be seen from image 2, but which has not been visible as a result of the influence of metaphorical cave thinking in which the occupant never has an opportunity to go outside, in which it is assumed that the universe is a closed system. Here, then, is the conclusion, and it is left to the reader to make their own determinations:

> *Since the phase shift depends on mass even in the case of a gravitational field, it seems in retrospect almost accidental that the mass drops out of the classical gravitational equations...since the COW experiment confirms the applicability of quantum mechanics in the presence of gravity, including the non-geometrical mass dependence, the experiment seems to be a step in the undermining of the purely geometrical point of view.*
> *Yet one strange feature in all this is that in most cases where a symmetry manifests itself in a classical theory, the quantum version of the theory tends not to eliminate the symmetry but to greatly strengthen it. The failure of the classical geometrical conception of gravity in the realm of quantum mechanics would run counter to this trend. Perhaps, then, nature still has some major surprises in store for physicists before they finish the task of smoothly joining the theory of gravity and the theory of quantum mechanics.* 27

Static versus dynamic

It may seem somewhat strange to many that what began life as an exploration of a philosophical idea at best should arrive at this point, in which what was identified as a microcosm should have significant scientific application. Certainly, there are implications for the task of '*joining the theory of gravity and the theory of quantum mechanics*, but this is not in itself an urgent concern here. It is enough to note that image 2 equivalence provides the mass element in a fractional form that mirrors the use of mass at the quantum level. However, the contrasts between the two types of equivalence is not yet fully explored, and some further detail should be added here. It is clear from image 1 that equivalence is presented in a static form. Whatever happens in one lift, it remains the same size as the other. However, image 2 equivalence represents each as a system; the lift <u>and</u> the mass of the planet make a unity, and the discussion of each component as if entirely separate is not possible. This system, however, has an interesting equivalence in that the accelerating lift shows this relation between the mass and the acceleration. Consequently, it should be affirmed strongly at the outset that mass in image 2 does not and cannot equate with any kind of concept of a gravitational field, and consequently it has no correspondence to a space-time continuum. What we discover is that the addition of mass in one system creates a stronger degree of attraction, and yet this addition (which would have to be substantial in order to change the degree of attraction even by the smallest amount) corresponds to a small, added exertion on the part of the accelerating lift. Consequently image 2 equivalence is extremely dynamic and far from static. This strengthens the view that a state of no-change (the apparent inertial state) is a state of constant re-evaluation, in contrast to the state of inertia ruling in image 1 equivalence, where there is no re-evaluation. Furthermore, what is meant by 'dynamic' is that what is microcosmic at the accelerated level is directly related to what is macrocosmic at another. Indeed, it is this dynamism that is yet to be entertained in science with a view to re-evaluating the quantum gravity issue in the articled cited that was written over 30 years ago. One more thing to note, however, before moving on to more urgent matters: in image one, we find ourselves observing what appears to be an experiment, yet the conclusion of that experiment is identical to doing no experiment at all. Indeed, it is only an apparent experiment since what it concludes was precisely set up, so that nothing new could be derived from it other than the base assumptions which are highly philosophical, but of a low order of philosophy. Consequently, we should not imagine that any conclusions that have been drawn from this experiment such as light-bending or frame-dragging can be given any credibility. These have, in fact, been dismantled by the scientific community investigating these conclusions. But what is worth pursuing here is the contrast between the extremely static picture of reality presented by relativity in its current form, and the dynamism of the microcosmic view.

Static versus dynamic

Lee Smolin in his book 'The trouble with Physics' hones in on just this problem. It lies in the fact that no real progress has been made in physics since the beginning of the 1980s. It is no coincidence that this date coincides with the COW experiment. In the introduction he writes:

> *The story I will tell could be read by some as a tragedy. To put it bluntly – and to give away the punch line – we have failed. We inherited a science, physics, that had been progressing so fast for so long that it was often taken as the model for how other kinds of science should be done. For more than two centuries, until the present period, our understanding of the laws of nature expanded rapidly. But today, despite our best efforts, what we know for certain about these laws is no more than what we knew back in the 1970s.* 28

Is it just a coincidence that this lack of progress coincides with the neutron interferometer experiment? Perhaps, but as he develops his thesis, a connection does begin to emerge, and it is entirely connected to assumptions about spacetime.

> *Whatever else one says about string theory, loop quantum gravity, and other approaches, they have not delivered on that front. The standard excuse has been that experiments on this scale are impossible to perform – but as we've seen, such is not the case. So there must be another reason. I believe there*

is something basic we are all missing, some wrong assumption we are all making. If this is so, then we need to isolate the wrong assumption and replace it with a new idea. 29

Clearly, experiments have been done, since the COW experiment cited came to its conclusions concerning equivalence as a result of that experiment. Yet the implications were never taken up, and it is only now, after thirty years of relative redundancy, that Lee Smolin is now directing our attention to the need for new thinking. Interestingly, it concerns the very implications to emerge from that experiment.

What could that wrong assumption be? My guess is that it involves two things: the foundations of quantum mechanics and the nature of time...But I strongly suspect that the key is time. More and more I have the feeling that quantum theory and general relativity are both deeply wrong about the nature of time. It is not enough to combine them. There is a deeper problem, perhaps going back to the origin of physics. 29

WE should not underestimate this conclusion. Questioning assumptions is not the usual business of science. Rather, assumptions give rise to concepts and the concepts to mathematical models. It is very rarely the case that science will work back to the assumptions to review them. This is partly because so much may have been built up already on the assumptions that it is preferable to tweak the models rather than make such a drastic change that could undermine an edifice that is already in the service of a world dependent on them. Furthermore, and to put it bluntly, questioning assumptions is not their business. As a result, we find that whatever new idea comes along, it comes complete with references to a spacetime context. It is never seen that the concept itself drops out of a seriously flawed thought experiment (trivialising the flaw by making its presence 'immaterial to us'). Consequently the unification of space and time into a reified structure dons the mantle of realism for no better reason than the perception that all advances in science are represented by unifications. In this case, however, it has been a disaster. The fact that Lee Smolin is at last raising this issue offers a glimpse of hope, if for no better reason than this: it is a problem situation that originally stems from something simple. This is how he put it:

Around the beginning of the seventeenth century, Descartes and Galileo both made a most wonderful discovery. You could draw a graph, with one axis being space and the other being time. A motion through space then becomes a curve on the graph. In this way, time is represented as if it were another dimension of space. Motion is frozen, and a whole history of constant motion and change is presented to us as something static and unchanging. If I had to guess (and guessing is what I do for a living) this is the scene of the crime....We have to find a way to unfreeze time – to represent time without turning it into space. 30

It is useful every now and again to pause and allow what appear to be, as here, scientific ideas, to fade to the background, and take stock in a different vein. The subject of relativity is concerned with the combination of space and time (which are here seen as static or 'frozen', but we should recognise that space and time are much like the principle of inertia. There is nothing that corresponds to inertia, but it should also be seen that a similar lack of correspondence exists with space and time. These are effectively instrumental concepts, and uniting them does not give them any more status of realism.

So far, we have found that much doubt surrounds the concept of the gravitational field as a real thing, which should not be a surprise, even though it may be difficult to grasp. But we should recognise that it is not an easy matter to throw aside the assumptions we have inherited as Platonic cave dwellers ourselves, and that part of the struggle in releasing ourselves from there is tied up with the inchoate sense that the real things presented to us there never possessed the realism they claimed for themselves. In effect, it should not surprise us that what was considered the real thing was a statue of reality which is only now being softened up. Moving towards something dynamic requires an entirely different light. Hence, the search is for a way of reformulating the physical experience to open a way to correspondences with deeper structures. Understanding the limitations of space and time is not difficult, but to reformulate these concepts in such a way that they adopt a new character is not so easy, and this is something that Lee Smolin recognises when he writes immediately after the passage cited above:

> *I have no idea how to do this. I can't conceive of a mathematics that doesn't represent a world as if it were frozen in eternity. It's terribly hard to represent time, and that's why there's a good chance that this representation is the missing piece.* [30]

If we now read this in the light of the current analysis, it is inevitable that time becomes a feature of a static view since stasis is the natural condition of a world apparently enfolded within the Newtonian notion of inertia. Not only that, but we see in Smolin a certain bias even here in which any alternative must be capable of mathematical modelling. Consequently, there are a whole range of questions that arise from this: what do we understand by motion? What is meant by space? Indeed, all the basic concepts of science revolve and draw their meaning from inertia, which in turn become enfolded in the local equivalence principle, so yes, Lee Smolin has identified the problem very precisely. This is the work in hand, for we can already see that gravity as an inherent feature of matter is beginning to emerge out of this mist of static thinking. It is because of this that we cannot expect the kind of re-evaluation that is taking place here to come from that direction.

It will not be at all clear what is meant by mass-time at this point. Suffice it to say that it is a concept to aim at once it is clear that spacetime as a concept is inadequate. Since it is identified with the gravitational field, and that this concept itself is derived from a flawed equivalence principle, the aim is to see what develops when the microcosmic equivalence principle stands in its place.

The physicist John Wheeler, when asked to sum up relativity in a few words, said that space commands and matter acts. No doubt he meant spacetime. There are two things to notice about this statement. Firstly, just because two instrumental concepts like space and time become welded together, it does not follow that the ensuing concept is a real thing. Secondly, we should also notice that this is saying nothing new that had not been said by Newton with regard to the principle of inertia. Matter is inert and is pushed along by forces. That is to say, there is no sense of self-propulsion in matter, and it is this conception that has become the accepted view of reality since its inception. However, while the laws of motion derived from this principle had a certain practical range of application, that limit did not extend beyond the moon and planets in our solar system. Space-time, on the other hand, is an attempt to increase the scope of application to the whole universe, and in this way the microcosmic inertia principle mirrors the macrocosmic spacetime manifold. For this reason, therefore, one should not think that Einstein has actually introduced something new; rather he has extended the range of the old to appear to be something new. Matter in both cases remains inert, and the underlying assumption remains intact. Furthermore, the assumption is that this view derived both from a local level and a preference for an earthly lineage, or styptic thinking, automatically applies across to macroscopic scales. This has the effect of forcing the large to resemble the small, and not in fact to see the small mirrored in the large.

But now we can consider this phrase 'spacetime commands' in more detail than the principle of inertia allows, because it is the attachment of time to space that makes space the dominant feature, and which freezes time. One attempt to make this appear dynamic is to see packets of frozen spacetime coming at us in a line, much like the frames of a film, each of which is entirely frozen, but the succession of which is to create the appearance of motion. This attempt at a solution to unfreeze time does not recognise that the basic assumption of inertia that froze it in the first place keeps that view intact. Secondly, if the element of space in the attachment is responsible for the stasis, it follows that any motivational notion of change lies with the time element.

However, if that is the case, we should recognise that there are two kinds of time. The chronological notion of time, the kind that we strap to our wrists, is not the kind of time to which any correspondences can be attached. However, changes occur frequently, and those changes are identifiable in terms of ageing, which is not the same thing as the measurement of ageing. This kind of time is usually referred to as Kairos time. It is more indeterminate and not at all concerned with measurement. Before proceeding further, however, we should consider more carefully the notion of motivation.

Because we are accustomed to think in terms of inertia, it is not an easy thing to show that certain words that we use in everyday speech have their meanings greatly reduced in the shadow of the dominance of scientific reasoning for which their origins would be alien and incomprehensible. Such a case in point is the word 'endeavour'. Because the word smacks of animation, it lies outside the bounds of the kind of thinking that sees everything pushed by force and not acting of itself. And yet, the inner dimension is entirely devoted to endeavour as a self-propelled act. If this were not the case, there could be no re-evaluation going on at the microcosmic scale. But the current concepts of space, time, gravity etc are designed to keep it excluded which is in keeping with the pursuit of styptic knowledge.

It should be noticed that, just as the gravity field justifies itself by analogy to the electromagnetic field, there is a sense in which the notion of similarity leads to some kind of connectivity, although in the case of science the requisite evidence is lacking. This is also because the similarity is superficial compared to the deep differences. The same does not apply with the sense of endeavour, however. The first principles which are found in the natural world, at whatever level, are principles entirely to do with moreness. We can see this more clearly in biological terms where moreness is externally visible in the production of seeds. At the same time, just as we are part of the fabric of that reality, we should recognise a psychological and natural equivalent in every action and expression that links to desire, in that these reveal the things we are drawn towards as a matter of necessity on many levels.

What is more, while it may appear as though endeavour, effort and moreness are rational terms, their key meaning is derived from the will. It is, in other words, a felt state. The reason why it has not been given recognition up till now is that our own systems of thought have emphasised styptic knowledge which is characterised by the lack of the emotive as a fundamental aspect of physical structure. Central to that meaning that is quite the opposite of the styptic form is therefore the concept of attraction. We may be familiar with the use of this word as though it were symbolic with reference to magnetism, electromagnetism and gravity, since the symbolic forms of these tend to be regarded as though communicating a real thing which is far from attraction. But when reality is seen in terms of the will, attraction returns to the fore, and is key to understanding reality. Nor should it be regarded as a compulsion, in much the way that gravity is treated, but something driven inwardly by an impulse of action. It was mentioned earlier that Kant made his reputation on the back of Emanuel Swedenborg, by demoting his status as a thinker and raising his own in order to champion the Enlightenment cause. This cause was essentially the scientific programme which was then in its infancy, but which was driven by the principle of inertia and the concepts of time, space and motion that derived from it and which were successfully applied to the world. Swedenborg represented a block in that path that had to be cleared out of the way because he not only identified the principle of inertia as one with no attachment of realism, but also because his own view gave a central position to the notion of the will and 'endeavour' as real principles of action that had many correspondences. Consequently, where he uses the word 'attraction' he also uses the word 'impulse' as that within an object that corresponds to endeavour, and when this is found in mankind, that endeavour becomes 'affection'. Consequently, his view of reality already contained elements of the emotive, which in our time are extremely difficult to understand since it was necessary to trivialise these in order for the Enlightenment to succeed. And since our education programmes represent the interests of Enlightenment thinking, it is no wonder that there is no element of the notion of attraction/impulse/affection in any part of it.

From these few words, one should not only sense the universal application and presence of this attraction, but also realise that the use of the word 'affection' is actually a reference to that impulse. But because it has been so overused in superficial ways over the last few hundred years, its meaning has become trivialised though not lost. Consequently, it is the presence of affection that that makes reality dynamic, while it is the lack of it that makes it static. Logically speaking, therefore, we should see that spacetime leaves all of reality bereft of impulsion, and consequently will-less. For reality to be revived, it is necessary to split these two apart, space and time, and then marry time and mass. But the time in that case would have to be kairos time and not chronos time. While Lee Smolin is unable to conceive of this as a resolution to this crisis, it is interesting to note that nonetheless, the physics world dealing with the extremes of the universe should adopt a more biological approach:

1 Ours is one of a vast collection of universes with random laws.
2 There was an intelligent designer.
3 There is a so-far unknown mechanism that will both explain the biofriendliness of our universe and make testable predictions by which it can be confirmed or falsified.

Given that the first two possibilities are untestable in principle, it is most rational to hold out for the third possibility. Indeed, that is the only possibility we should consider as scientists, because accepting either of the first two would mean the end of our field. 31

Here, the right direction is outlined but for the wrong reasons. The predilection for experiment is derived from styptic knowledge. Not only that, we find that experiment is often as effective as no experiment at all, as here in Einstein's lift experiment. Furthermore, nothing of the nature of attraction, impulse or affection can ever be tested for as though some unknown mechanism since it is the whole picture, though hidden from view in plain sight. The whole universe echoes the thunder of desire from beginning to end, while experimentation is designed not to have ears to hear it. Even so, the biofriendliness of the universe is end-oriented when causality is seen as a triple form. When it is simply causal, then no end in view emerges. But since an end in view represents the very problem that stypticism excludes from the domain of reality, it has developed a built-in aversion even to the reference to it. Part of that aversion can be seen in the inspiration behind the notion of the multiverse.

The whole theory of the multiverse rests on the premise that our universe drops out of an infinite number of failed universes so that the notion of randomness suffers no harm. Randomness and not moreness is in the intellectual driving seat. But that aside, given the nature of fractional form encapsulated in the microcosm, that any part is constantly re-evaluating the existence of the whole of which it is a part, and given the central role played by attraction, we should note that the apparent inertia of any part is actually a state of what Whitehead once called a 'subjective aim' in matter, and while this is missing, we are imprisoned in the old paradigms (and this includes relativistic ways of seeing) and so find ourselves locked into styptical thought, even though it has run the course of its range of influence and can now go no further.

Masstime/conclusion

So what is mass-time? The answer is both simple and difficult. Suppose one discovers that a piece of wall is crumbling away in a building. It would seem easy enough to call a builder and have it repaired. The same does not and cannot apply to conceptual forms, however, since these eventually derive their meanings from basic assumptions. A flaw has been found in the local equivalence principle (which is easily visible in the lift experiment) but this cannot simply be repaired, since it is derived from the basic assumption of inertia. But in producing a more realistic equivalence, it is clear that virtually every concept one cares to think of is equally affected by the change. It is impossible to leave spacetime intact when it is an expression derived from a flawed theory. Furthermore, a great deal of what we think we understand about the universe is built up from it, so that even black holes, the Big Bang, dark matter and energy, even the basic concepts of motion are affected by this change. The only one touched on here is spacetime, and its re-evaluation has led to mass-time.

But it has been inferred that mass-time returns something of the nature of dynamism to reality, and that dynamism is effectively what spacetime excludes, which is that the motivation that underlies the order of things is attraction and impulse, and hence a subjective aim in matter itself. To paint this in a broad stroke, one has simply to state it baldly: matter is self-motivated, and attains to positions where a sense of moreness is at its fullest. This is another way of saying that matter, indeed all things, are expressions and forms of desire, and this is made visible in the act of falling. Nor is one to think of time as something strapped to matter as a wristwatch, but that as kairos time, all things age. As a result, we find in human experience all kinds of expressions that are offshoots of moreness as a real motivation, such as the accruing of wealth, or power, or property, or a thousand different things. Most of these, unfortunately, are negative in form. We also find it represented in eating and trading in that all these things are ways of making things our own and part of ourselves. Consequently, there is not anything in the universe that does not participate in this desire. Up till now, this has not been recognised since the form of natural thinking that has dominated has taken every step to ensure that all access to what is emotive is closed off, so that only the negative forms of desire, which are effectively desireless, rule the day.

Consequently, we can still apply John Wheeler's dictum here and say that mass-time commands and space acts. Even here, one should be aware of a severe restriction imposed on the form of this perspective, since it is not so much the notion of an abstract space that is meant here, but in actuality the whole electromagnetic field/spectrum within which mass-time has its life. (More on this detail can be found at http://vixra.org/abs/1411.0574) What should be noted is that the notion of commanding as it is used here is attached to time, just as it is for John Wheeler. But now that it is attached to mass, the conclusion can only be that what is meant by time is mass, and what mass is, is time. They are not two different ideas but the same idea in two aspects of experience. And just to stir the hornet's nest a little more, in fundamental form it is to say that mass-time is desire at a human level that is microcosmic, and attraction at a macrocosmic level.

A partial opening out has indeed begun in science since many of the criticisms made here have stemmed from work like that cited here by Overhauser and Dowdye. There are many others in the field that have not been mentioned, so one should not feel that this is brand new. On the other hand, unless the kinds of restrictions that have been imposed on thought by thought itself are lifted, we will continue to imagine a universe haunted by black holes, Big Bangs, dark matter, dark energy, a multiverse, gravity waves and gravitons as though these were real things, when in fact they are fabrications that have stemmed from a system of thought that has closed itself off from the emotive. There is something strangely surreal watching an army of scientists developing machinery at immense cost in order to look for things in nature that simply are not there. If science has taught us anything over the years, it is that the simplest models are the most likely. The current models have become so unwieldy that what we are actually presented with in science are 'fixes', in the way that a computer patch can be applied to stop a virus in a computer. It does not get rid of it, but it allows for business to continue as usual. What is a real thing? The more serious question is 'Is anyone really interested?' Can we really be satisfied that a bucket of water 'somehow knows', or do we wish to travel further, but in a way that better integrates what we think with what we feel? Put another way, our sense of self is much diminished in the current programmes of thought in which as human beings we are little more than dust as far as the scheme of things lies open to us currently. But what if we had a sense of the small in terms of the kind of microcosmic idea presented here? Apart from the discussion so far, one thing is clear, which is that it returns something of the nature of the epic to every individual life. Given that this is strongly the case, why do we insist on a life in which we remain small and styptic, never stretching our wings or looking further than the next leaf?

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