Chapter 35

The Information Lag

As described in the last chapter, the constant recession at c (in keeping with Special Relativity) of the origin at *Centre A* from the observer at *Centre B* – referred to as *Centre A/B* recession – governs both the unfolding of the universe and the way that it appears to the observer. However, this is only half the story, as the constant *c* must also govern the relationship between each and every *Centre B*. As we are about to see, although this phenomenon – which I will refer to as *Centre B/B* propagation – is a kind of secondary knock-on effect, it may be every bit as significant.

At the Level of Point-Masses

Curiously, there must exist a 'lag' in the propagation of information between objects, which varies with distance. This delay is due to the fact that, although the current *Centre A/B* state of any point-mass communicates evenly along the separation of *Centre A* and *Centre B* as they recede at *c* (between the edge of the observable universe and the observer), all *Centre B/Centre B* relationships must <u>*then*</u> propagate at the constant *c*. This means that:

- There must always exist a distance-dependent delay between the actual (current) disposition of a point-mass as described by its *Centre A/B* recession, and information relating to its experience of the *Centre A/B* recession of any other point-mass.

From the viewpoint of each point-mass at *Centre B*, the universe distributes this information radially in 3-Dimensions at *c*, obeying Newton's inverse square law. The closer together two point-masses are, the shorter the delay as *Centre B/B* information passes between them, therefore the closer to 'identical' their *Centre A/B* relationships.

Taking as an example the Sun and the Earth with each as a collection of point-masses:

Because the information embodied within light and gravitation takes around 8 minutes to travel between them, at any given moment each point-mass *e* within the Earth experiences each point-mass *s* within the Sun as possessing a *Centre A/B* relationship which is '8 minutes less receded' than it actually is. This means that the universe around each point-mass is increasingly 'out of date' with distance, relativistically at *c*.

Obviously this is true in terms of our familiar look-back distance which governs how we view stuff out there, but the *Centre B/B* relationship may be far more significant than that, because it represents the *entire state of the universe* at every distance, spherically around every point-mass. The information arriving at *e* tells of a universe whose maximum expansion to date is at *e* (*Centre B*, its own experience), whilst the surrounding universe is experienced – onion skin-like – as less and less expanded with distance. Point-mass *e* experiences point-mass *s* as inhabiting a universe whose *Centre A/B* radius is 8 light minutes shorter, and since the only limit to this effect is *Centre A* itself, the diminishing universe must 'act over infinite distance' between all point-masses[a].

[a] Gravity is said to act over infinite distance. However, within the twin demisphere model, gravity as a form of information transfer acts over the *maximum* but *finite* distance between *Centre A* and *Centre B*.

At the Level of Objects

Scaling this up – by which I mean multiplying up the point-masses within each body – this infinitesimal discrepancy becomes significant as an emergent phenomenon throughout the wider universe in accordance with the principle described, here in relation to atoms, by physicist Raphael Bousso,

> *'There are statistical laws that govern how very large numbers of atoms behave, so even though things look like they get incredibly complicated, they start simplifying again when you get to really large numbers.'* [a]

At the macro-level of celestial objects, the Earth always thinks the universe according to the Sun is smaller than it is, and vice versa, by the amount that the universe expands in 8 minutes, because each experiences the other as part of a universe that is 8 minutes less expanded. I believe that this *Centre B/B* experience of the dissemination of information relating to *Centre A/B* relationships may already be enshrined within Special and General Relativity as follows:

1) The point-mass is subject to Special Relativity, which describes the observer's *Centre A/B* relationship, and
2) The point-mass is also subject to General Relativity, which describes the propagation of changes in *Centre A/B* relationships throughout the universe <u>as they effect changes</u> in individual *Centre B/B* relationships.

Universe-Wide

From this, it is a short leap to the notion that this – the propagation throughout the universe at *c* of *Centre B/B* information regarding *Centre A/B* recession – is what *constitutes* the phenomenon of gravity. Newton framed no hypotheses… Einstein was similarly reticent. Dare we make this suggestion?.. Oh what the heck – let's go with it!

So what is this thing that pulls massive objects together?

In the model, gravity does not originate at the level of objects, but is instead an attempt to draw *each and every* point-mass into the same location, in order to iron out the discrepancy of the information lag so that the *Centre A/B* experience of each corresponds *exactly* to the *Centre B/B* experience of both.

> *Reflection…* This 'same location' goal is probably achieved within the black hole and as such may be expressive of the 'end of the universe' as discussed in Chapter 34. In this scenario, the reason that light is unable to escape the black hole is that all point masses within it share the same 'location experience' as the photon as described (for the photon) in Chapter 34: 'sitting on the cusp of *Centre A*, separated only by its obedience to SR'.

The mechanism behind this universe-wide tendency to iron out the information lag and close the gap between all point-masses may be a mystery, requiring that we simply accept it on empirical grounds in the same way that we accept the attraction between charges or the value of the constants, or it may have something of an explanation – or at least a description – alluded to earlier, as follows:

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[a] Raphael Bousso, *Thinking About the Universe on the Larger Scales*, from *The Universe*, Edited by John Brockman, Harper Perennial 2014, P301

Because all *Centre B/B* information received[a] is 'out of date' at *c*, the universe is experienced by each point-mass as less and less expanded with distance, and a massive object must therefore inhabit a universe in which other massive objects get 'smaller'[b] in all directions. As a result, the object exists within a 'delayed reaction' universe where it experiences itself as occupying more space than it experiences other objects occupying.

Now, remember 'the matchbox and the room' from Chapter 19?

- Less truespace = the matchbox
- More truespace = the room

Every object/point-mass in the universe experiences itself as the room, whilst experiencing every other object/point-mass as the matchbox. Throughout the universe, the matchbox is falling into the room.

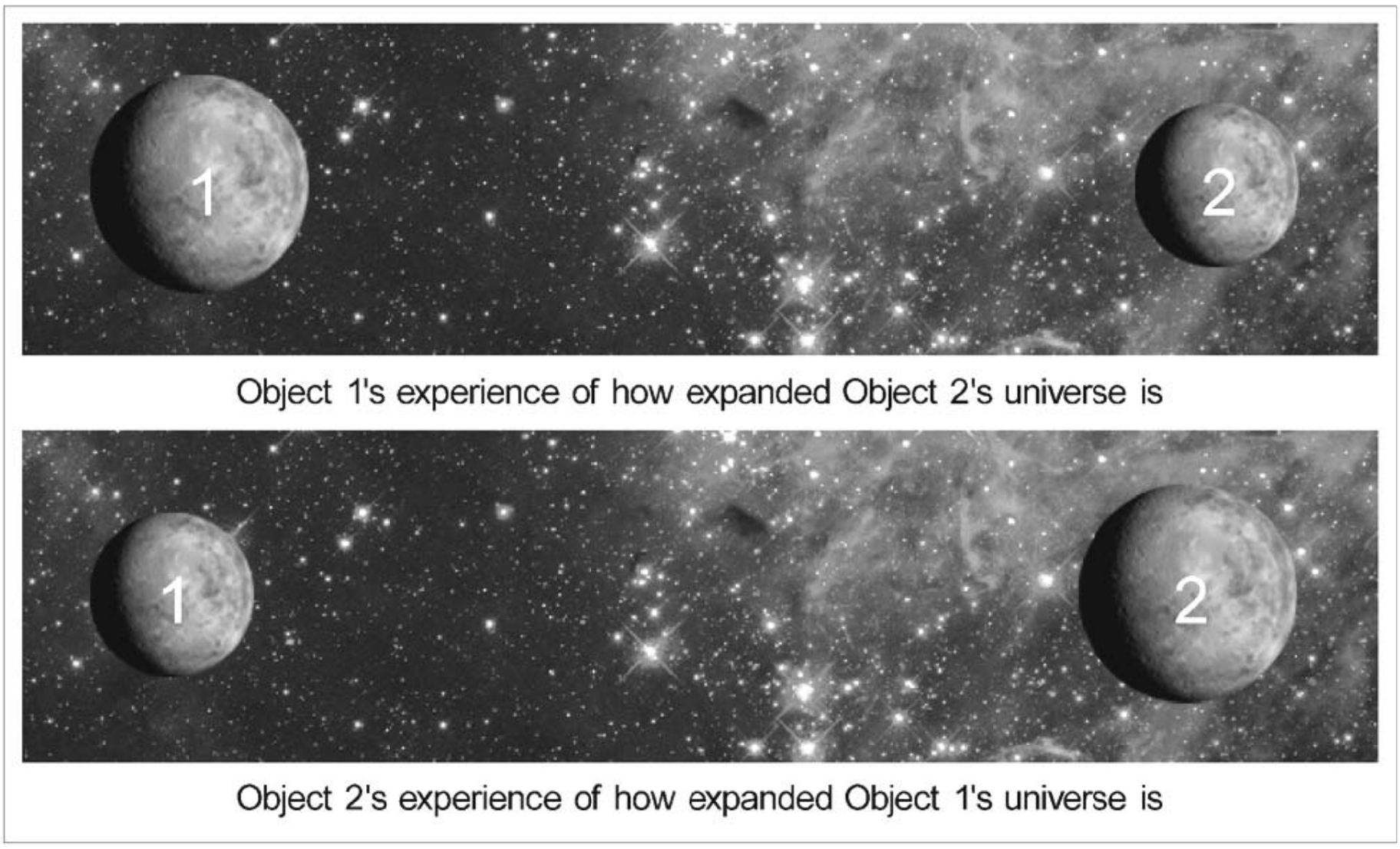

Fig.1 This (greatly exaggerated) shows the way the universe appears for any two celestial objects of equal mass (bearing in mind that it is not the object *itself* which appears smaller, but the universe it occupies). Both objects comprise a close grouping of point-masses, each of which maintains its own *Centre A/B* relationship. Because of the close proximity of each object's point-mass grouping in comparison to the distance between Object 1 and Object 2, the *Centre B/B* information lag scales up to operate universe-wide at the level of objects as an emergent phenomenon.

Reflection… Earlier, in Chapter 20, I described a process whereby a massive object in space 'borrows' slices of 3D from its surrounding 4D – analogous to the way that a lettuce leaf increases its actual 2D surface area relative to the area of its shape as might be viewed from above, by borrowing 'extra' 2D from surrounding 3D. This phenomenon – which I dubbed the 'lettuce effect' – is referred to within General

[a] Outwith a black hole.

[b] Whether or not the objects themselves get smaller, or it is just the space they occupy that is less expanded is unclear. As things stand, scientists accept it is just space itself that expands, with gravity able to act somewhat independently.

Relativity as relativistic volume and generates the local shape of space-time curvature.

It is possible that this may be the exact same process as described here but considered from the reverse perspective. Instead of looking *out* at the universe *from* the object – or, more precisely, from the point-mass – as we are doing here, the process of borrowing and paying back slices of the dimension above ('lettuce effect') looks *from* the adjacent universe *into* the massive object, describing a way to consider the contours of space-time curvature in terms of simple *Flatland* geometry. In other words, the relativistic volume of space occupied by a massive object is denser because, as viewed from outside, the universe it occupies (as defined by the *Centre A/B* recession of all its point-masses) is *more expanded than it should be from the outside*, borrowing from the dimension above in the sense that its *actual state* is the 'more expanded' universe from the immediate future with respect to the outside observer.

At the Antipode

Because of this, another point-mass *a* located at or close to the first point-mass *e*'s antipode at *Centre A* must seem (to *e*) to inhabit a universe which has *not expanded at all*, as all massive objects now in that location are the age of the universe away with an 'information lag' of some 13.8 billion years. All information about *a* now arriving at *e* is therefore 13.8 billion years out-of-date. Because of this, point-mass *e* within the Earth experiences information from its antipodean universe of *Centre B's* as a tiny disappearing singularity which 'dives into' *Centre A*.

This strangely 'point-shaped' universe is smeared evenly by the 'Antarctica effect' across the surface of our observable universe at maximum distance in all directions – in accordance with earlier descriptions of the twin demisphere universe[a] and the – slightly later by 380,000 years – CMB (see Chapters 26-28).

Information from objects *currently* located in that region will arrive at *e* in 13.8 billion years time, when point-mass *e* will experience that region as being as expanded as the universe *e* experiences now. Of course, point-mass *a* will no longer occupy the antipodean region, as *Centre A* will then be located at a look-back distance of 27.6 BLY (2 x 13.8) and *e* will then inhabit the 'centre' of a universe that has expanded to reflect the recession of *Centre A* from *Centre B* over a look-back time of 27.6 BLY. The universe will have doubled its radius, causing information from (what is now) the current antipodean region to appear to have travelled from the 2D equator.

Thus, all information that arrives at the observer from the look-back distance of the 2D equator shows the universe as it looked at $\boldsymbol{l}/2$ years ago, where $\boldsymbol{l}$ represents the observer's currently experienced lifetime of the universe.

As the universe expands in response to ongoing *Centre A/B* recession at *c*, the number of photons arriving at an observer on Earth from the CMB should decrease through time in keeping with Newton's inverse square law, eventually cooling to become the 'cosmic radio-wave background radiation'. Projecting this backward sees us immersed in the hot plasma fog at emergence through the Big Bang.

[a] See Chapters 26-28

What About the Void?

But what has the point-mass got that the immense vastness of space hasn't? Surely if expansion is homogenous, such an effect should be expected to affect all volume equally, such that it ought to be volume generally, rather than mass, which exhibits gravity.

Information propagates throughout the universe at *c*, and although the information itself relates to the presence of mass, the speed at which it is observed to travel (the invariant, *c*) does not. SR ordains that the photon, existing at *c*, is relativistically 'oblivious' to distance[a], but distance is a relativistic factor to the point-mass; as a result, to the observer having mass, expansion acts evenly across space, expressing the universe's state as experienced by each point-mass at *Centre B* in an observer-centric universe.

However, *Centre A/B* relationships are mostly concentrated within massive bodies which are themselves the result of the universe's ongoing 'clean-up job' – its attempt to iron out the information lag and bring all *B/B* relationships into line with *A/B*. The pattern formed by the distribution of this information throughout the cosmos in turn defines the contours of space-time curvature.

In addition, this explains why gravity may never be shielded against, because the gravitational field is a '3D map' of *Centre A/B* point-mass states as each experiences all the others, and as such merely a description of information throughout the point-mass matrix.

Equivalence

Earlier I quoted science writer Jim Baggott who writes,

> *'Inertial and gravitational mass are empirically [experimentally] identical, although there is no compelling theoretical reason why this should be so.'* [b]

However, by defining them in terms of *Centre A/B* and *B/B* processes we should be able to discern a common process at work:

- ***Inertial mass:*** When a force is applied to a massive object, this constitutes an attempt to alter all its *Centre B/B* relationships with the rest of the universe, which it resists in proportion to the total amount of *Centre A/B* relationship information that would require to be changed as measured by its 'number of point-masses', or mass.
- ***Gravitational mass:*** When an object experiences the influence of a gravitational field, it is subject to an attempt by a very large grouping of point-masses to draw *each and every* point-mass into the same location, ironing out the information lag so that the *Centre A/B* experience of each corresponds *exactly* to the *Centre B/B* experience of each. As with inertial mass, this must involve a change in the total amount of *Centre A/B* relationship information within the object which is proportional to its 'number of point-masses', or mass.

From this, the underlying theoretical reason for these to be empirically identical is that both inertial and gravitational mass demand a change in the total amount of *Centre A/B* relationship information that

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[a] The photon's universe is length contracted to zero. However, occupying a *Centre B* and therefore maintaining its own *Centre A/B* relationship, it obeys the principles of SR.

[b] Jim Baggott, *Higgs*, Oxford 2012, P4

must be communicated between every *Centre B* within the object and every *Centre B* throughout the rest of the universe, at *c*. The object offers up resistance (inertial) or compliance (gravitational) to this change, in proportion to its 'number of point-masses', i.e. the object's mass

Masslessness

Another potentially significant aspect of this scenario is that this phenomenon of the 'information lag' cannot apply to the massless particle for the reason that it and the propagation of its information always occupy the same location. The photon's riding of *Centre A/B* recession must coincide with its riding of *Centre B/B* propagation at *c* so that no delay can exist between any two photons, anywhere in the universe.

In the instant that it is viewed or experienced by an observer, the photon and its observer occupy (virtually[a]) the same location with respect to *Centre A*. To the point-mass there is no difference at that moment between its and the photon's experience of 'how expanded' the universe is, therefore, no lag.

When a photon is emitted it bears the stamp of the *Centre A/B* information of its point of emission; it then travels at *c* (with respect to all particles having mass) until it is absorbed or reflected, where it accompanies the impartation of a wealth of *Centre B/B* information from its history with respect to the observer. (Of course it is not *necessary* for the massless particle to come into contact with a massive particle for the current *Centre B/B* states of all point-masses throughout the universe to propagate, otherwise gravity would be carried by light!) *Centre B/B* information propagates through space at *c* for the reason that space itself is, in a sense, the expression of that information transfer process; i.e. of the outworking of all *Centre A/B*, and therefore *Centre B/B* relationships throughout the universe.

Although the photon is viewed by the observer as *having* followed the contours of space-time, these were not set by itself, but by all the *B/B* information delays all around it. The massless particle travels at the same speed, *c*, as information relating to the universe's radially diminishing expansion with respect to every observer at *Centre B*, and it is this *Centre B/Centre B* information lag – interacting according to the local density of point-masses – that forms the map of space-time curvature throughout the universe[b].

Implications

From this we may see that expansion and gravitation are indeed connected phenomena, but not as currently thought. Gravity does not 'resist' the mystery of dark energy-fuelled expansion throughout the universe. Instead, in accordance with Special Relativity, it is the propagation of information at *c* relating to the recession of *Centre A* from *Centre B* that causes our universe to appear ever more expanded, with gravity as the outworking of the *Centre B* to *Centre B* information lag at *c*.

Reflection… Interestingly, one of the most profound implications of the *Centre B/B* information lag may be the idea that, had the value of *c* been different, the force of gravity might be different. A faster value for *c* would mean that *Centre B/B* information would communicate faster, resulting in a universe where *Centre A/B* information between point-masses would display the emergent property of seeming

[a] In the case of absorption of the photon, it may perhaps occupy the exact same location.
[b] In terms of the dimensional structure this is synonymous with truespace, or the 3rd Dimension.

generally ‘more accurate’ over a greater range. This would affect everything so that it would describe a very different universe, or, probably more likely due to ‘fine tuning’, none.

Within the twin demisphere model, our primeval universe would have experienced the propagation of *Centre A/B* and *Centre B/B* information in *exactly the same way that it does now*, rewinding right back into the singularity, so that gravity is no longer required to have ‘distilled out’ through phase changes and cooling, even if other interactions did. This would certainly account for gravity’s long appreciated difference from the other three forces.

Please note that – whether or not this provides something of an answer to the question of what gravity actually *is* – it could never have been arrived at so long as our mechanism for expansion was based around the *action* of gravity, because the cart was preceding the horse. In the Standard Model, gravitation – counter-balanced by dark energy – rules the mechanism of expansion, whereas in the twin demisphere model, expansion – or, more fundamentally, *Centre A/B* recession – rules the mechanism of gravitation. Simply by adjusting the puzzle[a], the new model, as an expression of Einstein’s preferred spherical solution to the shape of the universe, allows these pieces to fall into place.

In this chapter I have presented a model of expansion which is not only linked mathematically to Special and General Relativity and the speed of light and gravity by the geometry of *Flatland*, but is also *wholly independent of the dominating activity of gravity and ‘dark energy’*.

Can such a radical upgrade to the Standard Model possibly be justified?

[a] The approach counselled by physicist Carlo Rovelli in *Reality is Not What It Seems*, Penguin 2017, P189