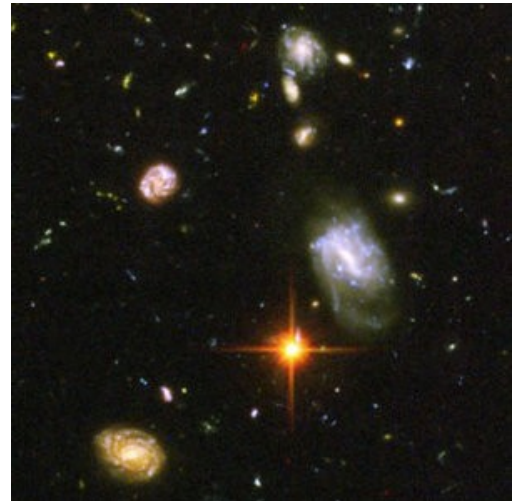


## Chapter 2: A Point Of View

**Footnote Article: The Universe: My Personal Perception**

*It is widely assumed that science provides an objective view of the universe. But any view of the universe can only be as it is variously perceived by each human consciousness from experiences invoked by inputs from the 5 senses. Consequently, any view of the universe must necessarily be subjective.*

The universe, by definition, is a single object. As such, every part of it is, in some way, connected to all other parts. It seems to occupy three-dimensional space. The relative positions of its recognizable features change with time. It is thus, by definition, an event. Whatever may exist outside it cannot communicate with anything inside it. If it could, then the thing outside would, by definition, be part of it, and therefore inside it. Consequently, the universe can be perceived only by conscious entities that are located within it. Notwithstanding, there could be aspects of the universe that must be fundamentally beyond the perception of such conscious entities.

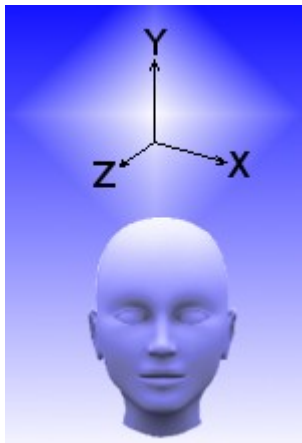


I perceive myself to be such a conscious entity. I perceive the universe. However, my consciousness perceives that the depth and diversity of its *physical perception*, facilitated to it by the body within which it resides, is very restricted. And it is exclusively through the channel of this physical perception that I am able to perceive the universe. So, what has this power of physical perception of mine perceived of this physical universe of time and space within which I exist?

**Perception of Space**

My earliest experience of time and space was during long summer days spent as a young child in my grandparents' back garden. There was a big lawn, a greenhouse and a vegetable patch beyond. The garden was rectangular. I gained my infant sense of distance, direction, speed and even acceleration while moving from one favourite little niche to another as they basked in the summer sun speckled by the shadows of the fluttering beech and sycamore leaves. It was a small and relatively flat world that ended abruptly at the garden fence.

As I became a little older, I gained more of a sense of the world beyond. I remember the "epic" shopping trips into the centre of Manchester on which I was taken with my mother and grandparents during the dark times of World War II. I was too young to be aware of the War. I had never known anything else. What impacted me was the enormity of this world beyond the back garden. Nevertheless, this bigger world worked by the same rules. The bus, although it went further and faster, moved in essentially the same way that I toddled. The laws of motion were conserved.



Soon, I reached the age at which I, like everybody else, acquires the mental power of abstraction. I could, mentally, place things into categories and abstract properties or behaviours that were common to different things I saw and experienced in the world. I noticed, for instance, that the walls of the rooms in my grandparents' house were vertical. I saw that some were at right-angles to each other while others were parallel. The floor and ceiling were horizontal but at different levels. This practical observational experience facilitated my perception of the X, Y and Z axes of Euclidean geometry. Later, I gained the ability to perceive the idea of rotation also with regard to these 3 mutually-independent axes.

## Flat Earth

Years later, I was taught at school that people in ancient times thought that the world went on for an enormous distance as a kind of undulating flat plane. In other words, it was a vastly scaled up version of my grandparents' garden. It was a world that followed the rules of Euclidean geometry. It seems there was great speculation as to what was at the end or edge of this enormous Euclidean plane. Many believed that if a ship sailed over the edge, it would fall forever in an infinite abyss.



However, I was further taught that, thanks to the objective observations of science over the centuries, we all now know that the Earth is round like a ball. In other words, it is spherical. Of course, the objective view of science now tells us that even this is not the whole truth. The Earth is only *approximately* spherical. To get the "true" shape of the Earth it is necessary to apply [elliptical corrections](#). But even this does not take account of certain gravitational dents (due to asymmetric mantle density), ground undulations and probably 1001 other factors as well.

## Spherical View

I do not need to go up into orbit or even fly in an aircraft to see that the surface of the Earth is not a flat (Euclidean) plane. I have seen ships sail from Felixstowe harbour, watching as their hulls disappeared below the horizon while their masts and funnels were still visible. This clearly illustrated that the surface of the sea curved away from me. I have stood on an ocean cliff many times and in many places. There, on a clear day, I have seen the curvature of the ocean horizon. The straight edge of the superimposed blue rectangle in the following photograph clearly reveals that the ocean surface curves also from one side of my view to the other. The fact that I have seen that the ocean curves both away from me and from side to side shows that the curvature of the ocean horizon is spherical. The Earth is shaped like a ball.



I am therefore sceptical of the notion that there were not at least some observant thinking people, even from the most ancient of times, who could, from such a common vista, deduce that the surface of the Earth was curved and not flat.



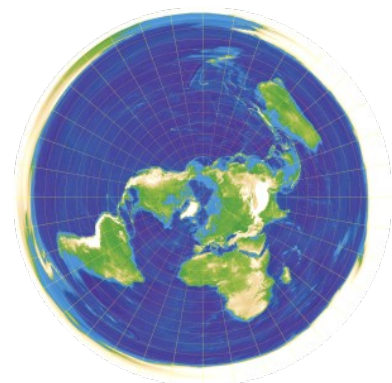
The observation that it is not flat, and the deduction that it must be spherical, gives the Earth a comforting property. It is a closed homogeneous surface. I can therefore wander around it forever in whichever directions, for however long, covering whatever distance. And I can do this without being in danger of ever falling off its "edge" into an infinite void. However, an important consequence of knowing that it is a very large sphere means that I now *perceive* the Earth differently from the only way I am able to *see* it.

The reason I can perceive the Earth as a sphere is that I have experience of spheres closer to my own size. For example, a football. My spatial perception can therefore scale up the notion of a football to a sphere the size of the Earth under the same geometric rules. However, as an Earth-bound non-astronaut, I can never *experience* the Earth directly as a sphere from any point of observation I am able to occupy.

## Polar Projection

To get some idea of how I could directly perceive the whole Earth from my lowly ground-based view-point, I have to imagine that I can see as far as I like across the surface of the Earth. I need to be able to look over the horizon. To achieve this, I shall conduct a thought-experiment. I shall imagine that light follows the curvature of the Earth, remaining always at essentially the same height above the surface. In other words, I shall imagine that a geodesic curve appears to me as a straight line. How will I then see the world?

The answer is that I see it as a flat disk, like the polar map shown on the right. Here, I am standing at the Earth's North Pole, looking outwards in all directions. I can see and recognise all the continents and oceans in their proper places. But they do not appear as they do on a spherical map. The nearer features are not very different. But South America and Australia appear seriously distorted. Antarctica appears absolutely weird. Antarctica is, in reality, a compact island continent upon the spherical surface of the Earth. Contrarily, in my Earth-bound view, it is nothing but a messy streak splayed out as a ring around the periphery.



I must, at this point, make a further stipulation. Light may travel from any place on any latitude, including the South Pole, to the North Pole. However, it may not continue onwards to loop the Earth's surface completely. If it could, I would see a manifold comprising ever-fainter repetitions of the Earth's surface features in ever wider annuli, each annulus commencing with a view of the back of my own head splayed out around its entire circumference. The validity of this constraint will become apparent when I apply this idea to the whole universe later.



In this view, the South Pole, which is a single point, appears as a circle of over 80,000 km circumference. Assuming that the Earth's surface be uniformly lit, this distortion will cause objects further from my point of observation at the North Pole to appear dimmer. For example, the light falling on Antarctica is spread out all around the rim of my view. Only a small amount of light will therefore arrive from any direction. The luminosity of my view of the world must therefore appear as illustrated on the left. I see features that are close to me brightly. Features further and further away appear less and less bright. The South Pole itself will probably be black, so I won't see it at all.

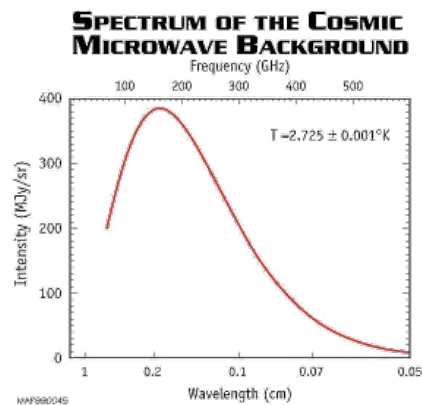
This model of my Earth-bound view is not as far-fetched as it may appear. I could, instead of light, choose to view the Earth by means of some kind of [over-the-horizon radar](#) system using Low Frequency radio waves. These tend to follow the Earth's surface. These LF radio waves would take about 6.7 milliseconds to reach me from the South Pole. A consequence of this is that The South Pole would appear to me, not as it is "now", but as it was about 6.7 milliseconds ago. Things on the Equator will appear, not as they are "now", but as they were about 3.3 milliseconds ago. Things 1 metre in front of me would appear, not as they now are, but as they were just over 3 nanoseconds ago.

I will now add just one more constraint to my thought experiment. I shall suppose that light (or LF radio waves), instead of only taking 6.7 milliseconds, take about 13.7 billion years to get from the South Pole to me at the North Pole. I am conscious of "me" as I am now. However, things only one metre in front of my face will appear to me, not as they now are, but as they were over 1,000 years ago. Things on the Equator will appear as they were 6.5 billion years ago. The South Pole will appear to me as it was 13.7 billion years ago. This is just a matter of scaling a perfectly scalable situation. The principle is the same.

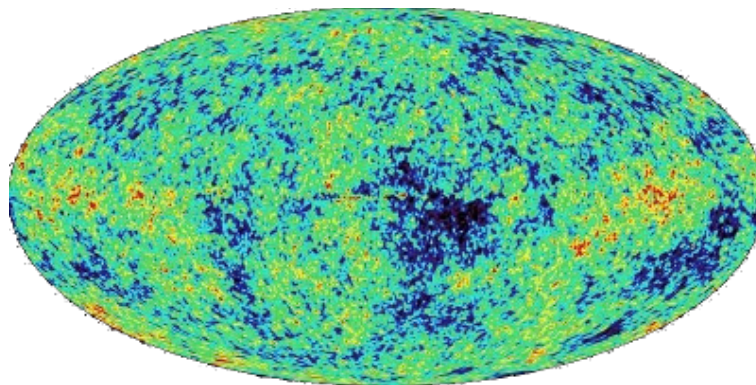
## Microwave Background

The theory among cosmologists, that has prevailed for some decades now, is that the universe began with a big explosion about 13.7 billion years ago. The concept is that the universe started (somehow) as an unimaginably vast amount of energy packed into what tended towards being an infinitely small point. This then expanded into the universe as it "is" today. From this theory, cosmologists predicted mathematically that there should exist an echo of the initial explosion, which should be in the form of electromagnetic radiation somewhere in the microwave spectrum.

In 1964 this radiation was discovered. The spectral profile of this radiation is shown by the graph on the right. Its peak intensity, at around 170 GHz, apparently fits comfortably with what the theory predicted. It was identified as the echo of the initial explosion that started the universe by the fact that it was measured to have equal intensity from every direction in space. Since its discovery, better measurements have been obtained. Modern satellite-borne instruments have mapped this echo radiation over the entire celestial sphere.

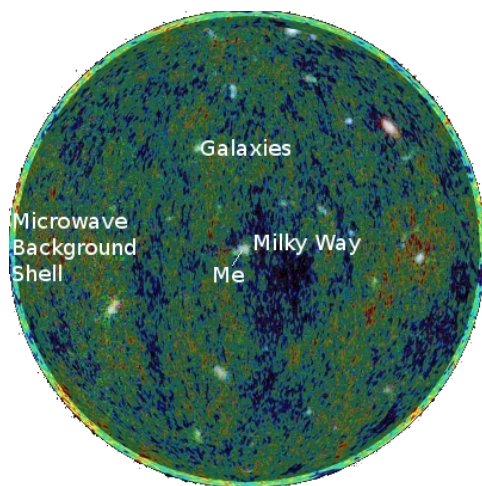


Eventually, finer measurements revealed that the intensity of this radiation *did* vary ever so slightly with celestial direction. Below is a projection of the inner spherical surface of the background radiation sphere. The variation in colour indicates the subtle variation in intensity according to from which direction in space the radiation is being received.



### Spherical Universe

This microwave background radiation (the echo of the Big Bang) is apparently the most distant phenomenon that can be detected. It originates from the maximum distance that it is possible to "see" into the universe. It comes from what appears to be the *edge* of the universe. This raises for me some interesting points of perception.



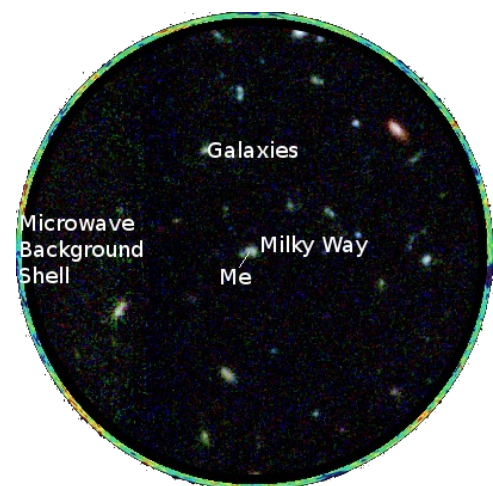
The universe appears to me (a human observer) as a sphere. I am at the centre of this sphere. An apparent bounding shell of this sphere is the source of the microwave background radiation. All the stars and galaxies in the universe are contained in this shell. This suggests to me that I must be *inside* the Big Bang. From my terrestrial experience of space and time, I would have expected the Big Bang to appear as a super-bright point of gamma radiation far out in space and hence way back in time: not a shell of dim microwave radiation surrounding everything. If it be an "echo", what "mirror" is reflecting this microwave radiation back inwards towards me?

Then I realised the answer. I am not "seeing" the universe. Rather, I am not seeing the universe as it is. Instead, I am seeing an unfolding history of a *part* of the universe. It is the part of the universe that can be seen *only* from my unique position in space and time. I am seeing what is my own unique personal *event-horizon*. Of course, on the scale of the universe, the unique personal event-horizons of all human beings on Earth are indistinguishable from each other. But no two can ever be identical. The universe as a whole, as it is "now", is something neither I nor anybody else can ever see. For we who are bound by space and time, such does not exist.

So how can I build for myself a *cogent perception* of my personal event-horizon and the unseeable universe whose existence it implies. The only conceptual tool-kit I have to hand is the relationship between my perception of the Earth as a spherical planet and my surface-based view of it as a polar map described earlier.

## Dimension Reduction

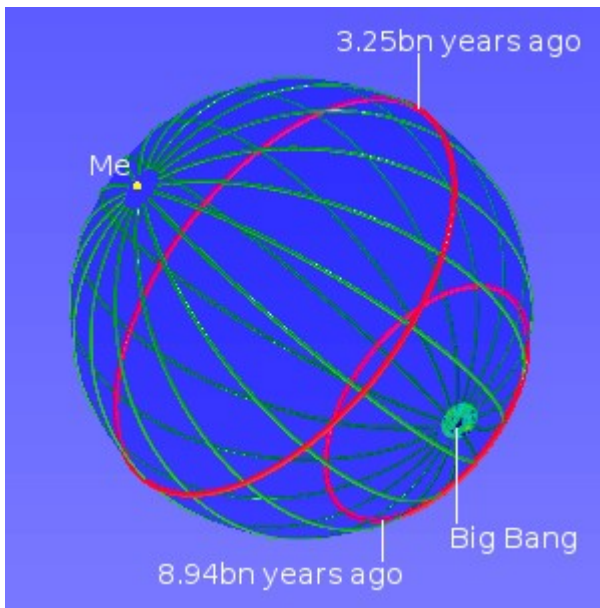
In the previous illustration above, I imagined the visible universe (my event-horizon) as a hollow sphere containing stars and galaxies bounded by a shell of microwave background radiation. What if the 3-dimensional spherical event-horizon that I see is a polar map view of something that has 4 dimensions. The only way I can represent such a thing is by reducing the number of dimensions. I shall therefore represent my 3-D spherical event-horizon by a 2-D slice of it. I thus end up with a disk whose diameter is the same as that of my spherical event-horizon. So imagine that the diagram on the right represents such a disk rather than the whole sphere.



I wish to add here that I do not feel intuitively comfortable with representation by dimension reduction. A two-dimensional plane is not really analogous to 3-dimensional space. So, when doing this, I must be permanently aware of conceptual pitfalls. I have the same reservations about representing time by a linear spatial dimension. Time is perceptually different from space and making it mathematically equivalent is, to me, dangerous. Nevertheless, I am lost for another option. I shall therefore continue cautiously with my dimension reduction as an aid to my perception of the universe.

## Event-Horizon

I therefore perceive my 3-dimensional spherical view of the universe as a polar map. My 2-dimensional slice of this visible polar map of the universe is a dimension-reduced version of the 3-dimensional polar map. In it, the "North Pole" of my event-horizon is the point in space and time from where I experience the universe. The outer coloured rim of microwave background radiation is equivalent to Antarctica, the very outer edge of which is the "South Pole". Light takes 13.7 billion years to reach me from this outer rim.

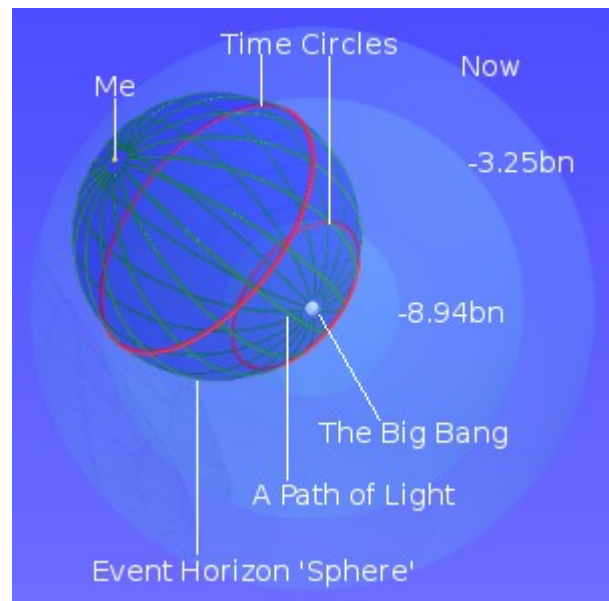


By analogy with my ground-based view of the Earth, I deduce that my 2-D disk is really the surface of a sphere, as depicted on the left. The disk's outer rim of microwave background radiation is therefore at the opposite pole. It is the point-sized super-brilliant "big bang". I have included in the diagram two arbitrary latitudes. One is where I see objects as they were 3.25 billion years ago. The other is where I see objects as they were 8.94 billion years ago. Light from the "big bang" and all other objects that I am (theoretically) able to see "now" has travelled to me along the geodesics (lines of longitude) of my event-horizon as it fleetingly exists "now".

Even one nanosecond ago, my event-horizon was a slightly smaller sphere. Even one nanosecond hence, it shall be a slightly larger sphere. My event-horizon is a continually-expanding sphere. Nevertheless, at any instant, only a *part* of the universe is visible to me. Fundamentally, at any instant, only a part of the universe *can be* visible to me. This *part universe* comprises a continuous sequence of infinitesimally small rings. Each ring corresponds to an instant in time stretching all the way back from "now" to the time of the "big bang". Each ring is where my event-horizon sphere intersects the real universe at each instant from "now" back to the time of the "big bang". So what does the real universe look like at any particular instant in the past?

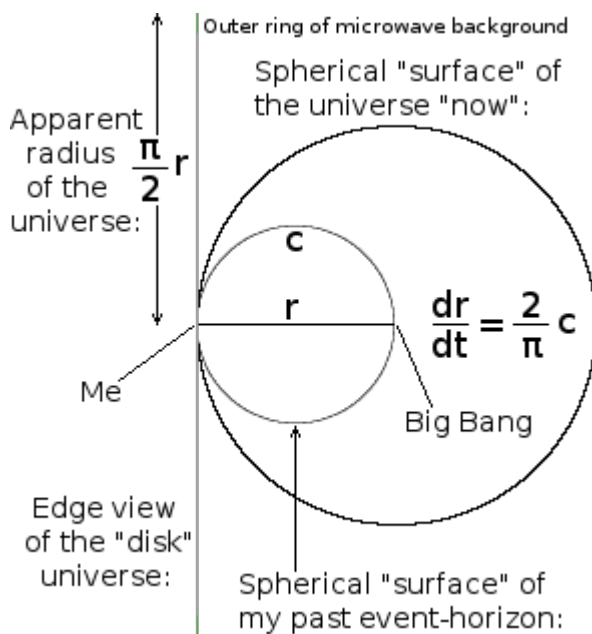
### Sphere Within a Sphere

According to this model, the universe must comprise the surface of a sphere that is twice the radius of my event-horizon sphere. On the right, my event-horizon sphere is shown contained within the universe. My location ("Me") is a point on the spherical surface that represents the universe at this instant. That same point is also at the North Pole of my event-horizon sphere, at which information from the universe's past has, at this instant, just arrived. The North Pole of my event-horizon sphere is thus the exclusive point from which I am able to experience the universe. The surfaces of the two smaller concentric spheres represent the universe as it was 3.25 and 8.94 billion years ago respectively.



At the centre of this enormous sphere, whose 2-dimensional surface represents the universe, is the universe as it was when it started. In other words, the point at the centre of this sphere is the Big Bang. This "point", however, is not itself an infinitely small sphere. The Big Bang is represented, in this reduced-dimension model, by the 2-dimensional surface of an infinitely small sphere. This is important. The infinitely small circle of latitude where the surface of this infinitely small sphere intersects with my event-horizon is my event-horizon's South Pole.

I imagine that the radiation of the super-brilliant Big Bang must have been of a species that is beyond scientific observation and theory. I shall call it super-gamma radiation. It must have circulated around the infinitely compact surface of the Big Bang micro-universe as radiation of a stupendous frequency and of planckoscopic wavelength. As the universe expanded, space (represented by the 2-D surface of my universe sphere above) also expanded. Consequently, the radiation pervading that space must have expanded correspondingly. This continued until today the expansion of space has caused that radiation to increase its wavelength to about 1.9 mm and reduce its frequency to a corresponding 160.2 GHz [or wavelength 1.06 mm and frequency 283 GHz, depending on how it is calculated]. And this is why the Big Bang appears so dim when viewed today from the North Pole of my event-horizon.



I can only ever see (or otherwise detect) anything from information arriving along a geodesic of my event-horizon sphere. Consequently, the radiation arriving from the Big Bang can only have come along such a route. In fact, it is the one source of radiation that would come "equally" from all directions (lines of longitude) around my event-horizon sphere. The length of this radiation's journey must therefore have been  $\frac{1}{2} \pi r$ , where  $r$  is the diameter of my event-horizon sphere, which is the radius of the universe-now sphere. Consequently, the speed at which the radius of the universe-now sphere is expanding must be  $2c/\pi$ , where  $c$  is the speed of light. Integrating with respect to time gives the radius of the universe-now sphere.

This offers one possible explanation as to how I got to where I am today ahead of the electromagnetic radiation that is only just arriving here from the Big Bang. I took a short-cut. I, or rather the point on the universe-now sphere that I occupy, travelled the direct radial route along the South to North axis of my event-horizon sphere. The radiation currently arriving from the Big Bang, on the other hand, took the long route. It travelled along a line of longitude on the surface of my event-horizon sphere. So I did not have to travel faster than light to get here ahead of the radiation. I only had to travel on average at just under 64% of the speed of light.

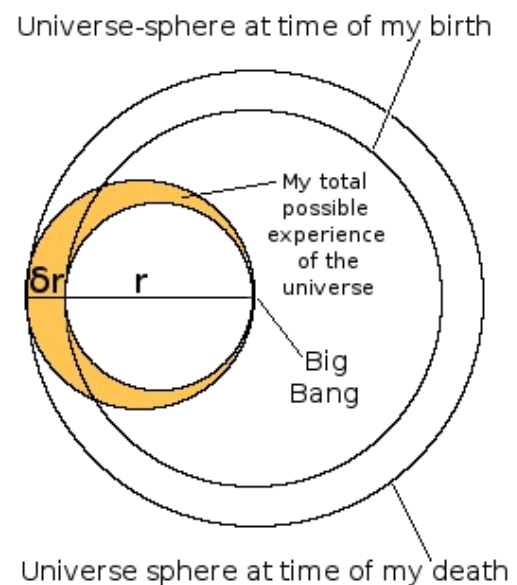


## Event-Continuum

An interesting consequence of this model is that my own path through time, along the South-to-North axis of my event-horizon sphere, is fundamentally inaccessible to my experience. It is forbidden territory. I can never see, observe or experience "me" as I am now or as I was at any time in the past. My own past is just as inaccessible to my conscious experience as is my future. I can only experience the past of a small portion of what is not me. And *how far* back into the past depends on how far away the object of my experience is from me. Thus, what I am able to experience of the universe is fundamentally very restricted.

In this model, the universe-now sphere and my event-horizon sphere represent the universe and what I can experience of it *at a single instant*. Perhaps there is an indivisible unit of time. Some people refer to it as the Planck interval. However, at least on the macroscopic scale, there is no evidence to suppose that time is not a smooth continuum. In other words, an instant - as a real object - does not exist. Time passes smoothly. And it is always passing. The notion of taking a freeze-frame snap-shot of time is not a reality. It is simply an artificial construct of the imagination.

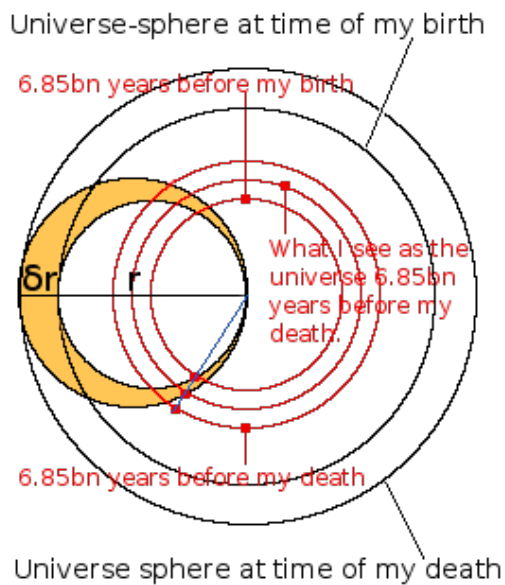
To gain a true picture of reality, I must therefore imagine my universe-now sphere and my event-horizon sphere as being in a continuous state of coordinated expansion. In the diagram on the right, I have tried to illustrate this by depicting a finite span of time, namely, my own lifetime. At my birth, the universe-now sphere has radius  $r$ , which is also the diameter of my event-horizon sphere. By the time of my death, the universe-now sphere has expanded to a radius of  $r+\delta r$ , which is also the new diameter of my event-horizon sphere. The universe-now sphere thus expands by a small amount  $\delta r$  during my brief lifetime, which is also the amount by which my event-horizon sphere expands. The coloured area represents the solid crescent that is the difference between my death and birth event-horizon spheres.



This solid crescent represents my *event-continuum*. It is the locus of my event-horizon sphere as I pass through time from my birth to my death. Thus it represents the fundamental bounds of what I could possibly experience of the universe during my entire life. It is fundamentally impossible for me to experience anything in the universe that is outside the bounding surface of this solid crescent.

## Time Appears Non-Linear

A striking observation I can draw from this representation is that the time-span, over which I can observe, contracts as I go back into the universe's history. At the time of the Big Bang, the solid crescent is infinitely thin. This means that, from my point of view, the Big Bang is frozen in time. This will essentially render it invisible. The microwave background radiation presumably originates from a very short time after the Big Bang. If I were to listen to it on my UHF scanner all my life, I would be really only sampling a few seconds worth of the original radiation. Hence, the 160.2 GHz signal I hear must really be super-gamma radiation of a stupendous frequency that tends towards infinity.



On the left, the inner red circle represents the sphere that represents the universe as it was 6.85 billion years before my birth. That's half-way back to the Big Bang. The first red dot on the blue radial line is where my birth event-horizon intersects that universe-now sphere. This red dot is on the circle of intersection (latitude) on my birth event-horizon sphere that corresponds to the time 6.85 billion years before my birth. Any object on this circle will appear as it was at that time. As time passes, such an object will move radially outwards from the Big Bang. At the time of my death, that radial (blue line) intersects my death event-horizon sphere. At this point, the universe-now sphere represents the universe only half my lifespan older than the universe sphere at the time of my birth.

At the time of my death, I therefore *perceive* that same object to be only half my lifetime older than it was at the time of my birth. The outer red circle represents the universe-now sphere that represents the universe as it really was 6.85 billion years before my death. But the object concerned is outside my death event-horizon. So it is fundamentally impossible for me ever to see it as it then was.

The upshot of all this is that time, as I perceive it along my event-horizon, is non-linear. It contracts according to a circular function. Space, on the other hand, appears to expand according to the spherical polar mapping function. So there is an apparent increasing contravergence in the scale of the relationship between space and time as I look further and further into history along my event-horizon.

All the foregoing presupposes that the rate at which the radius of the universe-now sphere,  $r$ , is increasing be constant. However, the effect of gravitational attraction between stars, galaxies and other objects in the universe tends to put a brake on the rate at which space can expand. Nevertheless, because all objects are necessarily getting further and further apart with time, the effectiveness of this gravity-brake gets ever-weaker. The rate at which the radius,  $r$ , of the universe-now sphere is increasing is therefore likely to be diminishing. The expansion of the universe is decelerating. This would tend to make my event-horizon sphere somewhat egg-shaped, making space and time and the relationship between them even more non-linear.

I have more confidence in the constancy of  $\pi$  than I do in the constancy of the velocity of light,  $c$ . Consequently, according to this model, since the value of  $c$  is locked to the rate of increase in  $r$ , the velocity of light,  $c$  cannot have been constant in the long term (i.e. over the 13.7 billion years of the universe's speculated existence).

## Back to 3 Dimensions

I have used the event-horizon sphere within the universe-now sphere to represent the expanding universe. It is a continually expanding 3-dimensional object. To construct this representation, however, I had to reduce the 3-dimensional space that I experience in everyday life to the 2-dimensional surface area of my universe-now sphere. So the radial dimension of the sphere appears to be an extra dimension, which is non-spatial.

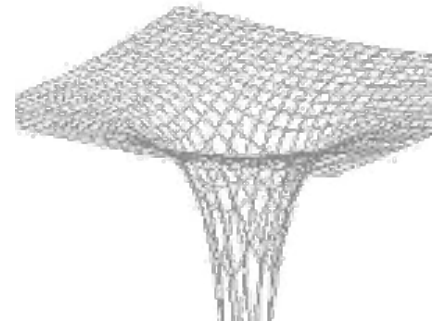
In my representation, this extra dimension *behaves* like time. But it is not time. It is merely a spatial representation of time. Time is not space. A scale drawn along a spatial dimension can be used to represent time in a quantitative sense. But it is not, and cannot represent, the *concept* of time. It cannot represent what time *is*. So the radial dimension of the universe sphere is not what it seems. In fact, it doesn't really exist. It is simply a way of representing the behaviour of time.

To create a more realistic representation of the universe, as I experience it, I need to convert the 2-dimensional surface area of my universe sphere back up to 3-dimensional space and carry with it the *behaviour* of the universe sphere's radial dimension. How can I do this? How can I get rid of a dimension? The answer is: by making the 3 space dimensions non-linear. However, their non-linearity cannot be arbitrary. It must reflect the behaviour or influence of the discarded radial dimension upon the 2-dimensional area of the universe sphere's surface.

### **Nested Non-Linearities**

As previously discussed, time appears non-linear along my event-horizon and the passage of time also appears non-linear within the bounded event-continuum that represents how my event-horizon changes throughout the duration of my lifetime. This is the first non-linearity that greets my perception as I look out into the universe.

I have postulated a further non-linearity that superimposes itself upon the first one. This is that the 3 space dimensions themselves are rendered non-linear according to the way they are constrained by the size and rate of change of the radial dimension in my model. Consequently, the universe that I perceive, must be a complex compounding of these real and apparent non-linearities of space and time. So, as a conscious entity, looking out into the universe through physical senses, I do not have a very good vantage point from which to attempt to understand the underlying reality of the universe.



### **What Am I Really Seeing?**

I remember looking up one night into the clear tropical sky in northern Minas Gerais, Brazil. I was far from the madding street lights of any city or even a remote settlement. The stars leapt out before the backdrop of the ghostly white cloud of the Milky Way directly over my head. But what was I really seeing. Were these exotic objects, hundreds of thousands of light-years away, influencing my sense of sight from their majestic remoteness?

Not really. My sense of vision was receiving its input from electromagnetic fields that were oscillating directly within the retinas of my eyes - right at that moment. The observation that the corneas or lenses of my eyes focus my visual experience, from a short distance in front of my retinas, suggests that the influence came from that particular direction.

But how far has this visual effect - this light - come? I don't really know. Nobody can measure how long it takes light to travel between two points. One can only measure how long it takes to make a round trip - there and back - between two points. Dividing this by 2 does not necessarily reveal how long the light took to travel one leg. This is especially so if, over cosmic distances, space and time are really and apparently compositely non-linear.

Using the Döppler red-shift to calculate the distance of a cosmic object could therefore give very erroneous results. Observed red-shift may not be due to the Döppler effect. It may be due to the expansion of space itself and the apparent contraction of time as seen through the observer's bounded event-continuum.

## **My Perception of Time**

Experience of my everyday world gives me a perception of time. This perception is the creature of the events that I see occurring within my everyday world. A human life is an event. An evening concert is an event. Each, however long or short it may be, has a beginning, a middle and an end. It is not surprising, therefore, that I am tempted to use this framework to try to gain a conceptual view of the universe.

But there is a problem with this. A human life or a concert are not really complete events. They are merely identifiable features of the one and only real event that is the universe. A human life is procreated. Something happened in order to bring it about as an identifiable phase in the dynamic continuum of life on this planet. It will most likely also be the part-procreator of another human life to follow. Similarly a concert had to have a procreator. Somebody had to organize it. Its musicians had to spend many years learning how to play their instruments to such high standards.

The universe, on the other hand, is by definition a complete event. Nothing caused it. If it had a cause, then whatever caused it is part of it. It will also cause nothing further. If it were to do so, then what it caused would be a continuation of it and thus be part of it. This makes the perceived beginning of the universe into what mathematicians call a singularity. A singularity is where everything disappears into nothing or appears out of nothing. Consequently, the universe's perceived demise must also necessarily be a singularity.

I have already said that I do not feel intuitively comfortable with dimension-reduction as a means of making dynamic models of space and time easier to represent geometrically on a flat piece of paper or computer screen. I feel the same way about singularities. Mathematicians can construct functions with singularities. But they don't jibe well with my experience of the real world. So the idea that the universe had an absolute abrupt beginning does not rest easy in my mind. The beginning of time is an incongruous notion for me.

Of course, the mathematics that theoretical cosmologists use, to objectively model the evolution of the universe from an initial point in time, seem well behaved. Notwithstanding, they cannot be sure that the operators and variables they are using are valid in such remote uncharted regions like the depths of the universe. All their mathematical techniques lie proven only within our small terrestrial domain. But suppose that variables they assume to be linear are not. Suppose that such variables cannot be related by mathematical operators like  $+$   $-$   $\times$   $\div$  Grad, Div, Curl etc.. I think it is folly to go skating off into mathematical models that are geometrically unimaginable. Extrapolating symbolically beyond what one can conceive is dangerous.

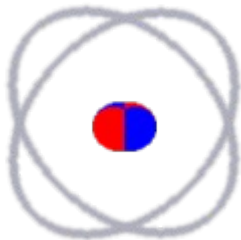
## **Fabric of The Universe**

The universe is, by definition, a single object. The conception within my mind is that it is composed of a kind of force-field fabric. All features that exist within the universe - waves, particles, atoms, molecules, planets, stars, galaxies etc. - can therefore be nothing more than oscillating folds or convolutions within this universal fabric. I therefore perceive all things physical as either travelling or standing wave structures within this universal fabric.

Notwithstanding, the universal fabric seems not to be simply analogous to a piece of cloth or a latex membrane. There seems to be something quite different about it. It seems to be infinitely stretchable and twistable, and seems to flow like a fluid. It is as if this universal fabric is continuously extruding out of every *information-source*, in every direction, at the speed of light.

I use *information-source* as a generic term to include all travelling disturbances within the universal fabric. These include electromagnetic waves, gravity waves and whatever other phenomenon may bring detectable information to an observer about an event that occurred within his past event-horizon.

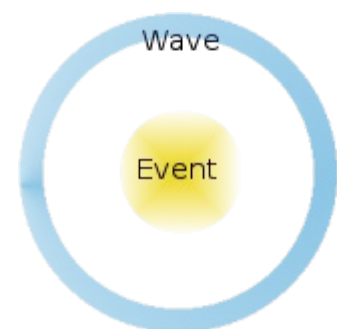
I shall dare to take the liberty of extrapolating this idea and propose that therefore this universal fabric extrudes from every point in space at the speed of light. Consequently, from the point of view of every point in space, the universal fabric appears to be continuously extruding away from it in 3-dimensions.



If a standing-wave structure such as an atom falls to a lower-energy state, it causes a change in a local ruck in the universal fabric. Since the fabric is extruding continuously like a spherical conveyor belt in all directions at the speed of light, it carries the ruck with it. The ruck thus appears as an electromagnetic pulse diverging in all directions from the atom's location at the speed of light.

However, it is not the wave that is moving. The wave is something that gets left on the extruding fabric as it diverges outwards in all directions. The travelling wave is thus like the skin shed by a snake as it moves along on its journey. This is consistent with my reduced-dimension model where the space in the universe is represented by the surface area of the universe-now sphere. Light from a distant galactic source arriving at my eyes *appears to me* to have travelled along a geodesic (longitudinal line) of my spherical event-horizon. However, since the only reality in my model is the surface of the universe-now sphere, the real path of the light must have been along a geodesic of the universe-now sphere. The velocity of light in the real universe must therefore be  $2c$ .

If the radius,  $r$ , is expanding at a velocity of  $2c/\pi$ , then the surface of the universe-now sphere is expanding in circumference at a velocity of  $4c$ , that is,  $2c$  in each of the two opposing directions. Any stationary "point in space" on the universe-now sphere will therefore expand as an ever-widening circle as the universe-now sphere expands with time. A ruck made in the fabric, by an atom "emitting" a wave, at one point in space and time will therefore naturally move outwards as an ever-expanding circle, whose radius increases at twice the speed of light.



However, this universal fabric is stranger still. An atom can also absorb energy from a travelling electromagnetic wave. The absorbed energy then causes the atom to shift to a higher energy state. But according to my universal fabric idea, it is not the wave that is impacting the atom. It is the atom that is hitting the wave. Or rather, it is part of an enormous spherical "ruck in space" that passes the point in space where the atom is located and thereby kicks the atom into a higher energy-state. This is what happens when the appropriate atoms in the retina of my eye observe the arrival of a light wave.

When light from a distant source arrives at my eye, my eye only captures energy from *the small part* of the expanding spherical wave-front *that corresponds to the size of my eye*. The rest of the enormous spherical wave passes by or gets absorbed somewhere else. The same occurs for other light sources from other directions in space. Together, the captured bits from all sources appear to converge towards my eye at the speed of light. They are all borne up on what appears to be the aspect of this universal fabric that is continuously converging towards the point in space where my eye is located. The remainders of the vast spherical wave-fronts from all these sources pass by my eye without effect. They are outside my past event-horizon and are therefore not part of my universe. I can have no sense of them or connection with them. To me, they do not exist.

However, the light I see does not appear as a shrinking circle of space on my universe-now sphere. It always appears to arrive from successive universe-now spheres of the past along the circumference of my past event-horizon sphere. Thus, from my point of view, along my event-horizon sphere, space is *apparently* being sucked-in to my point of observation at the velocity  $c$  from every direction. Consequently, as well as extruding the universal fabric in every direction, my point of observation appears to be independently sucking-in the universal fabric *from* every direction. Making the same extrapolation, may I propose that every point in space is also sucking in this universal fabric at the radial speed of light?

### A Paradox of Perspective

Every point in space thus appears to be in continuous full-duplex communication with every other. And this is what *unifies* the universe. It is what makes it a **universe**. But it also raises a paradox. It means that the space represented by the surface area of the expanding universe-now sphere in my model, as well as expanding, is also contracting. As well as being spewed-out, it is also being sucked-in at every point.

This makes the Big Bang no more than a visual construction - a vanishing point of perspective - from which the expanding aspect of space-time is projected onto one's personal event-horizon. It follows that a second vanishing point - an Anti-Big Bang - must exist that corresponds to the contracting aspect of the projection of space-time onto one's personal event-horizon. They are analogous to the two vanishing points required to construct a projection of a 3-dimensional cube (physical reality) onto a flat paper or screen (one's personal event-horizon).

This duplexity suggests a dynamic steady state, or at least, a meta-steady state. It thereby sidelines the singularities at the beginning and end of time and space because vanishing points have no real existence. Of course, I cannot represent this within my reduced-dimension model. However, I can picture it quite cogently within a finite continuum of dynamic 3-dimensional non-linear space.

The apparent physical paradox of space at once being effectively both extruding from and sucked into every point seems overly complicated. It reminds me of the geocentric versus heliocentric controversy at the time of Nicolaus Copernicus. Of course, the movement of the planets appears much simpler if we regard the sun as the centre of the solar system rather than the earth. Notwithstanding, the position of the observer cannot change the mechanism. Pretending to be in the middle of the sun does not simplify the laws of physics: it merely alters the point of view of the observer. All positions of observation are equally valid, whatever the object being observed. It is just that things can appear much more complicated from some positions than from others.

Perhaps, therefore, it is because of our disadvantageous position within the vastness of space and time that we can only come up with the equivalent of complicated "geocentric views" of the

universe? If only we could observe from a different vantage point (such as riding on a light beam), perhaps we could gain a simpler and more satisfactory view of what the universe is? For instance, perhaps we could apply a geometric transform to extruding and sucked-in space that can turn them into a single "stationary" frame of reference. Perhaps from such a vantage point the universe would appear a little more "heliocentric".

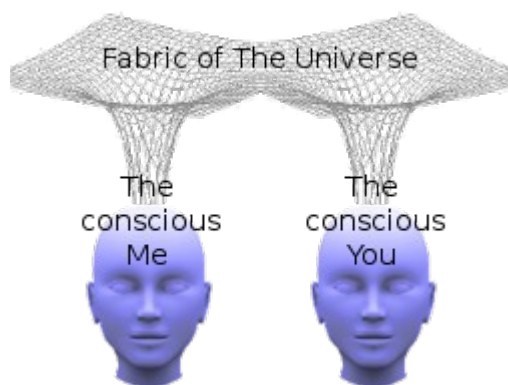
## Significance of The Universe

The universe has significance only from the point of view of a conscious entity that is perceiving it. As a conscious entity, I am constrained to perceive the universe, along my current event-horizon, from the point in space where I am currently located.

In my reduced-dimension model, the surface area of the inflating universe-now sphere represents the expanding space within the universe. It is easy to visualise that, upon the surface of this sphere, any point has exactly the same status as any other point thereon. There is no "zero-point". There is no absolute point of reference. It is a relativistic universe. Consequently, although each perceives it from his slightly different point of view, the universe should appear, to every conscious observer, to behave in exactly the same way. Thus, all conscious observers are equal. None is king.

The universe is therefore such that I can perceive you only provided that you are within my past event-horizon at the time. I can therefore only receive a message from you that you sent at a time in my past. You can only receive from me a message that I sent at a time in your past. Consequently, for us to be able to engage in full-duplex communication, our messages must traverse consecutive event-horizons that leap-frog each other as the universe-now sphere expands with time. It is this profound property of the universe that realises the possibility of communication between conscious entities.

A poignant corollary to all this is that I, as a conscious entity, exist exclusively at some point on the universe-now sphere. That point coincides with the "North Pole" of my event-horizon. From my point of view, the point at which my conscious awareness is located is the oldest point in the universe. All that I perceive is in my past. It is therefore closer to the time of the Big Band than I am. Consequently, for me, all else exists at places in the universe that are younger than the point where my [conscious awareness](#) is located. Consciousness, therefore, must only exist at the leading-edge of space-time. It is as if the hypothetical shell that bounds the expanding universe is itself the location - and indeed, the very essence - of consciousness. Consequently, if it be possible at all for conscious entities to communicate directly, that communication must take place along or through the surface membrane of that hypothetical shell.



The significance of the universe, from the point of view of conscious entities, such as we, is that it provides the means for us to perceive each other, to communicate and hence [to relate](#). It is the universal fabric that connects conscious entities, which otherwise would be separated from each other in the dark silent prison of eternal isolation. But this universal fabric is not just like a radio link between individual consciousnesses. It also provides the context of the language in which we communicate and the very essence of the content of what we convey to

each other. This, in consequence, becomes the very essence of what we are individually as conscious entities.

The spatial structure of the universe, and our ability to move independently within it, benignly regulate the intensity with which we may communicate and relate. Spatial proximity facilitates intense exchange between us. This intensity diminishes rapidly with increasing distance. When we are close, we can communicate with an all-consuming intensity. When we are far apart, we can still communicate but without it consuming all our attention. It affords each of us the freedom to gauge the degree of socialisation or solitude he desires or requires at the time. The universe thus facilitates our spiritual development or evolution as conscious beings. But it is up to each of us to deploy this facility wisely and constructively, or foolishly and destructively.

Though the universe provides the means for us to communicate and relate, this is only really feasible within the confines of Planet Earth. If you were to visit Mars while I remained on Earth, there would be a long delay between me speaking to you and my hearing your response. This could be anything between 6 and 45 minutes, depending on the distance between Earth and Mars at the time. This is impractical for carrying on any kind of conversation, although it would be quite adequate for us to correspond by email. The universe is so vast that many people think that there is a good chance that some other planets could be host to intelligent life. If so, could we [converse with them by radio](#) and hence develop beneficial relationships with them too?

As for what the universe is and how it functions, we can never truly know. To do so, we would have to be able to observe it from its outside, which, since we are part of it, we can never do. We can only speculate. Consequently, all ideas about the universe - whether they be the current collective vogue of cloistered academia or the idle mental meanderings of a lay-theorist like myself - must necessarily be subjective.

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