Geometric Model of Time

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2-11–2016

Abstract: *The purpose of this article is to provide an alternate, strictly geometric, interpretation for the observed phenomenon of time. This Geometric Model of Time (GMT) is consistent with both Theories of Relativity but goes beyond current explanations for the nature of and the apparent one-directness of time - the so-called Arrow of Time.*
Key elements of the model are:

1. *Our space (not space-time) is 4-dimensional. No separate time dimension exists either physically or as any necessary mathematical distinction. All dimensions are identical and symmetric. No one dimension can be singled out to be universally labeled as time.*
2. *All physical objects in our universe are endowed with an axiomatic vectorial property we call velocity. The scalar value of this property (speed) is invariable and identical for all objects and is labeled as c (speed of light).*
3. *The experience of time as we know it is an illusion resulting from the observer's motion through space at c. "Time" is the term given by each observer to their own individual direction of travel in our physical four-space.*

This model is a better fit with observed phenomenon than current ones as well as being simpler and more elegant, elegance being defined as having symmetry (in the sense that it treats no dimension as being singular).

1 Questions to be addressed

This model actually addresses two distinct, if related, questions:

1. What is time? (known as "the problem of time")
2. Why does time appear to only move in one direction? (known as "the question of the Arrow of Time")

2 Current problems with first question

The first question is often ignored in modern physics. It is simply accepted as just being there - another dimension by some interpretation, but one that is different from the space dimensions. *
And even explanations such the entropy model (see next section) mostly only address the second question.
The Geometric Model of Time (GMT) suggested here addresses this question. And in the process effectively eliminates the second question because the answer is implied in it.

*If M-theory is right, there may be more dimensions (10 or 11 depending on how they are expressed), but this does not in any way affect the ideas presented here. If anything, having 10 space-like dimensions and only one time-like one would make the asymmetry even more pronounced.

Even Einstein and Minkowski related to their own models of time as a 4th dimension as merely a mathematical tool, not literally another physical dimension like space. The problem with that answer is it lacks the symmetry that physicists look for in identifying the laws of the universe. Why does one set of rules apply randomly to three dimensions and a different one to just single other dimension?
One of the well-established principles of physical sciences is that a rule with many exception is probably not the correct rule. Said another way the simplest explanation is usually the correct one.

3 Problems with current model of time as function of entropy

The most accepted current model for Time's Arrow, originally suggested by Eddington in 1928 and also propagated by Boltzmann, involves entropy as an indicator of the forward direction of time. Second law of thermodynamics tells us that entropy of the entire universe, as an isolated system, will always increase over time, or remain same upon reaching maximum entropy state. Entropy model of time relies on this law to define the Arrow of Time as that direction of time in which the entropy of the universe increases.

There are a few issues with this model:

1. The model only works if the universe and time are assumed to be infinite. (In any arbitrarily sized finite space, entropy can randomly increase for limited periods of time. Only in an infinite amount of space can the total entropy be assumed to unquestionably average out as remaining same or increasing).

2. The total entropic state of this universe is assumed to be known (it actually cannot be), since the law is reached from noting that in all known cases entropy increased over sufficiently long time.

   There is, of course, also a simple statistical explanation for this; namely there are more ways for any group of constituents to be arranged uniformly (i.e. - in higher entropy) then in a more ordered (low entropy) way. But this statement of law still assumes we know the state of the whole universe and therefore know it increases in entropy over time. Not an unreasonable conclusion, but not a proven one.

3. As stated above, in any arbitrarily sized finite space entropy can randomly decrease for limited periods of time, yet there is no definitive indication that time either stops or reverses in those limited sections of space.

4. Increase in entropy based on 2nd law does not apply on microscopic levels, only macroscopic ones. Yet, one would be hard-pressed to argue that there

is no time on the microscopic level, especially when noting the fact that when taken together en-mass all microscopic events add up consistently with their macroscopic sums totals. This idea is similar to what is known as Loschmidt's Paradox, which can easily found in any good encyclopedia and will not be restated here.
One can indeed argue that since microscopic events, unlike macroscopic ones, are reversible, there is in fact no Arrow of Time on those levels. But saying that there is no definitive single direction of an Arrow of Time, is not same as saying time does not exist on those levels. After all, even if there is no one definitive direction of change, there is still a difference between the states of a particle in one moment and another.

5. Second Law of Thermodynamics does allow for entropy of even large system to decrease for short periods or even remain constant over long stretches of time if said system is it at its highest state of disorder. However, it would be highly questionable to claim that this means that time would actually no longer exists or stands still in said region (although, granted, it may be difficult to measure, or even quantify).

As a demonstration let us have a thought experiment.
Most familiar clock mechanisms rely on increase in entropy, such as the unwinding of a previously wound spring and such, or even the internal chemical processes within our body. However, this is not strictly a requirement. This alone should tell you of entropy's shortcoming as a model, but let us look in more detail.
An example of such a clock is a perfect pendulum clock (one with zero efficiency losses).
One such clock could be formed by any object in space, sufficiently far from gravitational effects, spinning at a steady rate in relation to an observer.
Let us design such a clock by spinning a wheel with markings on it in deep space and at a steady rate in relation to us.
Let us now put the whole contraption inside a large box.
The entropy inside said box may decrease, remain the same, or increase at random over any finite period of time. The very thinly populated particles of matter floating in space caught in the box during its construction may, purely by chance, all drift to be more densely concentrated in one area of the box than before. Yet, we'd still be able to observe and measure time as moving forward by counting the steady turns of our spinning wheel.
For simplicity, let us assume complete vacuum.
Of course if the observer is inside the box watching the wheel turn, then it is the observer's own internal clock that is adding to the entropy. Else they would not be able to know one moment of the wheel's position from another. This is reminiscent of the so-called Maxwell's Demon scenario.
However, if we place the observer outside the box (and therefore outside the isolated system), the system's total entropy will remain on average unchanged while it is sealed.
While the system remains closed and the observer outside, there is nothing we

can say about the condition inside the box. That is part of the definition of the system being isolated. We may even call it a "Schr'odinger's Wheel".
However, when the box is finally opened and we observe that the angle of the wheel has changed, we can say that time has continued flowing inside the box even while it was isolated despite the fact that there was no sum change in entropy. One can debate definitions and whether a tree really falls in a forest when no one is there to hear it, but it certainly meets all the criteria of what we experience as time.
Therefore time and entropy are only loosely connected at best.
It is as much an indicator for time as smoke from a train's chimney is an indicator of the direction of the train's movement. Useful one, to be sure, but not a fool-proof one.
Sure, in general and disregarding wind gusts one can use it to make good educated guesses of which way the train is going, but that is not to say that the smoke explains why the train goes one way and not the other, or how it came to leave the station in the first place.

In short, as Dr. Dave Goldberg puts it: Most would say that time makes entropy increase, not that entropy creates time.[1]

The Geometric Model of Time presented here eliminates the need to use entropy as part of the explanation.
The author, as some others have expressed, feels the entropy explanation gives us a mathematical general, though incomplete, way of breaking up time's symmetry, but it comes up somewhat short of explaining the mechanism by which time has "chosen" the direction it did for entropy to increase, nor why time has to always move at all. Entropy increases forward in time because the higher number of ways a system can be arranged more uniformly, but that leaves something very lacking in explaining why time moves at all. Furthermore, the entropy model can only explain the Arrow of Time when averaged over arbitrarily minimal spans of time and volumes of space, but not below those (i.e. not within smaller regions of space over shorter stretches of time).

4 An alternate Model of Time

To avoid getting caught in everyday preconceptions of space and time as we are used to thinking of them let us dispense with the terms space and time and instead only use the terms dimensions x, y, z, and t, and momentarily let go of all our preconceived intuitive notions of time and think of it as simply another dimensional axis.
Likewise, instead of "speed of light" let us use only c to help let go of our everyday concept of speed as a function of distance traveled over time. Instead let us think of it as simply a universal, unchanging, inherent, axiomatic property

[1] http://io9.com/5667872/does-entropy-increase-with-time-or-does-it-make-time

of any object within space (i.e. - our universe). Let us refer to this property as C, instead of ”velocity” and to its numeric value as c
It is similar to the way an electron’s spin isn’t literally a spin as such, but rather just a designation for a property which is somewhat akin of our everyday experience of a spinning object.
I am asking you to let go of these notions not so much because they are less correct, but because it will make the visualizations easier.

4.1 Recap of some established facts

Special Theory of Relativity tells us that nothing can travel though space (x, y, and z dimensions) faster then c.
As one speeds up along x, y, or z, one slows down in t. But it is more accurate to say that no physical object in our universe can travel faster OR slower than c though the 4th dimensional space x, y, z, t. There is no other speed. It is not a constant limit - it is a constant, period.

This fact is already mathematically well established, but for those not already familiar with it, here is one simple proof this author came up with on demand. There are other ways to prove it, but this one will suffice.
Length contraction is usually given to us by the Lorentz-FitzGerald equations as:

$$L = \frac{L'}{\sqrt{1 - \frac{v^2}{c^2}}} \tag{1}$$

Where L is rest length and L’ is moving length. However, saying an object contracts in the direction of its movement is proportionally equivalent to saying a dimension of space elongates in the direction of an object’s movement.
The two figures are inversely proportionate, $d = 1/L$ and $d' = 1/L'$, where d and d’ are the dimensional length for a rest and a moving object, respectively. Therefore we can instead write:

$$d' = \frac{d}{\sqrt{1 - \frac{v^2}{c^2}}} \tag{2}$$

Time dilation is likewise given as:

$$t' = \frac{t}{\sqrt{1 - \frac{v^2}{c^2}}} \tag{3}$$

(In other words time dilation and distance expansion are actually equivalent except for the units used)

Where:
t = distance traveled by the observer through the t dimension in observer's own frame of reference ("rest time")
t' = distance traveled by the relatively moving object through the t dimension as perceived by the observer ("dilated time")
d = distance traveled by the moving object through the x, y, or z in moving object's own frame of reference
d' = distance traveled by the relatively moving object through the x, y, or z in the observer's frame of reference
v = the speed of the moving object in a random space direction
c = the universal constant (speed of light in a vacuum)

Or, equivalently:

$$d^2 = d'^2 * (1 - \frac{v^2}{c^2}) \tag{4}$$

and

$$t^2 = t'^2 * (1 - \frac{v^2}{c^2}) \tag{5}$$

Thus we can write:

$$\frac{d^2}{t^2} = \frac{d'^2 * (1 - \frac{v^2}{c^2})}{t'^2 * (1 - \frac{v^2}{c^2})} = \frac{d'^2}{t'^2} \tag{6}$$

or

$$|\frac{d}{t}| = |\frac{d'}{t'}| \tag{7}$$

And since by definition: $v = \frac{d}{t}$ and $v' = \frac{d'}{t'}$ this means:

$$|v| = |v'| \tag{8}$$

In other words, the absolute value of the total combined vector of any object through a 4-dimensional space-time (i.e.- its speed through space-time) is the same regardless of frame of reference. That means that if it moves at c in one frame of reference, it moves at c in all frames of reference.

Now let us consider an object A stationary in a particular frame of reference and a light particle, traveling at c.
Since the photon is moving at c in A's frame of reference, then A is likewise moving at c in the photon's frame of reference.
And we already know that if an object moves at c in space-time in one frame of reference, then it moves at c in all frame of references.

Thus if light always moves at c then every other object in the universe also moves at c in space-time (however, its component vector projected onto any single dimension may be smaller).

Now, a frame transformation is equivalent to simply tilting the axes in a 4-dimensional graph[2].
In other words, mathematically speaking, space and time are completely equivalent and fully interchangeable (which should have already been intuitively obvious from the similarity of the two Lorentz transformations).

Of course, the naturally occurring question is - What, then, accounts for our distinctly different experience of what we call time as compared to what we refer to as space?

The answer proposed here is - nothing. Not fundamentally, anyway.
Mathematically speaking, the only difference is the velocity at which we are traveling along each of these axes.
My proposal here is that the numbers tell us the reality. The rest is perceptual bias resulting from nothing more than our own tremendous speed at which we are traveling through t. Furthermore, traveling along any "space" dimension at c or near c makes THAT dimension indistinguishable from time. i.e. it becomes the traveling object's "time".
Likewise the former t dimensions simply becomes one of the object's "space" dimensions.

Most commonly familiar massive objects are nearly stationary in x, y, and z relative to us as compared to massless objects. While along our own t they travel at nearly c (more on this later).

This may be somewhat hard to grasp intuitively. After all, you can see space, but you can't see time. And you can go back and forth in space, but time only flows one way, or so it seems.
Consider for a moment looking at a passing car as it goes by you on a freeway at 100 miles per hour and the way your vision of it seems to smear. Now try to imagine doing it at over five and a half million times that speed, while the space between you also stretches to infinity and your mutual notions of time or even simultaneity no longer match.
Chances are, your imagination fails. Our brains and senses are simply not wired for it and there is no comparable experience.
Which demonstrates how our intuitive sense of those things is simply not enough to make such determinations.

So let us examine these perceptions and reconsider them.

As suggested before, one must stop thinking of speed in the terms we are used to as distance of space traveled in certain time.
That is a useful convention in everyday life where most familiar objects speed

[2] L. R. Lieber, H. G. Lieber, 1945. The Einstein Theory of Relativity, 2008 edition Philadelphia: First Paul Dry Books, 350 p.

through time remains nearly constant relative to us, but it loses all meaning when discussed in relativistic terms.

Now let us examine the differences more methodically and address them individually.

5 Geometric Model of Time

In 1949 Ǵodel proved that time cannot exist in any universe described by Theory of Relativity.
Likewise the renowned John Wheeler and some of his colleagues have argued that since dimensions are selected arbitrarily, no specific dimension of time can exist. In fact, time appears to disappear, so to speak, in the Wheeler-DeWitt equation.

Let us consider a uniformly 4-dimensional space. By "uniformly" is meant that all properties of each of all four dimensions are identical in all aspects and their designations are chosen at random save that they are always perpendicular to each other.
Let us also imagine that it is a requirement of this space for any object in it to have a vectorial property of constant value and varying direction which we shall refer to as C as stated in the beginning of this article (or "four-space velocity", if you prefer). We shall call its non-varying scalar component speed and call its constant value c and select its units to be c=100%, or 1 (A.K.A. - natural units).
We may further call the direction of any object's velocity its t.
Of course regardless of t's direction, one can always take that vector's component onto any non-perpendicular axis.

The Geometric Model of Time proposes that it is indeed thus in our universe and all other phenomenon we perceive as time or as distinct space are in fact manifestations of the above described system.

Again, all objects have constant speed equal to c, only their c direction varies (and this gives their designated t).

Let us look at two objects A and B on such a system whose expressions of C (four-space velocity vector) are precisely lined up with each other. i.e. - they are precisely co-moving in direction.
Since their speeds are already identical, they will appear to be stationary relative to each other. Normally we would describe this as the two of them moving at same rate though time and being stationary in space relative to each other.
I other words, both have their vector C expressed exclusively in each other's t direction.

Now let us consider A the observer and B changing its direction (while still maintaining constant speed c) slightly at an angle compared to A (Figure 1).

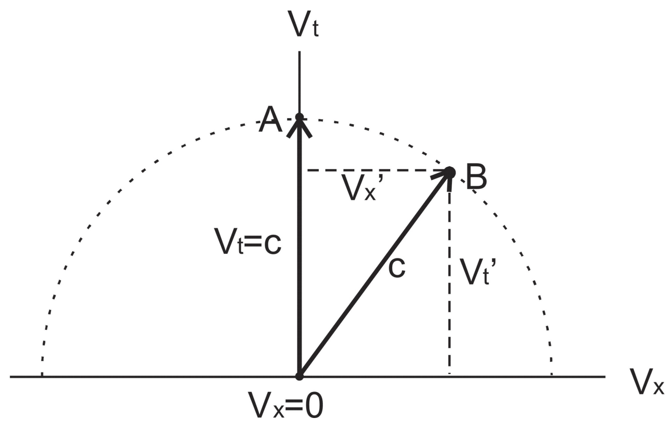


Figure 1

To the observer such object would appear to:

1. Be moving along x, y, or z (let us randomly designate the direction as x)
2. Slowing down along the observer's t.

Note that the axes show the objects' velocities and not their positions, where v_x is the object's velocity through space (in observer's frame of reference) and v_t is their rate of movement through time (i.e.- the speed at which their time moves from the stationary observer's perspective), defined as the ratio between the moving object's time lapsed and observer's time lapsed.

Notice that as B changes direction while its vector size remains the same and its angle relative to the A's vector changes, its tip traces out a circle of radius c around its base.
Of course, for practical reasons shown by Special Relativity (namely an objects relative mass increasing toward infinity as it speeds up in x and putting a cap on the vector veering more than 90 degrees) the shape is actually capped off at a semi-circle on the positive side of v_t .
As the vector angles away from the observer, its component onto the original v_t and v_x shrink and expand accordingly and can be given as follows:

$$v_t' = c * \cos(\sin^{-1} \frac{v_x'}{c}) \tag{9}$$

or, since $c = 1$:

$$v_t' = \cos(\sin^{-1} v_x') \tag{10}$$

Note that if we plot v_t' vs. v_x' using Lorentz transformations we get the exactly same graph!

Thus the above is nothing more than a CORRECT alternative to the Lorentz formulas.
Thus, GMT is indeed an accurate alternate model of the time phenomenon.

What, then are its advantages and what new answers or perspectives it can provide?
Let us look.

6 Why we appear to be able to move in time only in one direction

GMT shows one can actually freely travel in either direction along any of the dimensions, including t.

Reversing direction in space, by definition, requires first decelerating and passing the zero speed point, even if for an instant, and then continuing acceleration in same direction, opposite from the original direction. Since all objects with mass with which we are familiar with are already traveling in what we usually consider the forward direction of t, in order to reverse direction they must first slow down in t to a stop and then pass it.

Since one cannot travel at any speed other then c, slowing down to zero in t requires speeding up in one of the other dimension to c. However, this is not possible since it would require an object with mass an infinite amount of energy. That is to say reversing direction in time is possible, but according to Special Theory of Relativity is simply not achievable without infinite supply of energy.

7 Why one particular direction and not the other

The reason all observable physical objects appear to move in the same direction in time is that any object that happened to travel in the opposite direction at the moment of the Big Bang continues to get further from us in t with same difficulty in changing direction and therefore never intersects our path.
An experiment by Julian Barbour of the University of Oxford, Tim Koslowski of the University of New Brunswick and Flavio Mercati of the Perimeter Institute for Theoretical Physics involving a miniature simulated universe showed the spontaneous creation of two universes moving apart in different directions away from the experimental Big Bang moment.[3]
Sean Carrol (ironically, a popular proponent of the entropy model of the Arrow of Time) and Jennifer Chen of Caltech report a simulation with similar results, as does Alan Guth, father of the Inflationary Theory.

[3] Barbour, Julian and Koslowski, Tim and Mercati, Flavio (2014). Identification of a Gravitational Arrow of Time. Physical Review Letters, 113(18), 181101.

8 Why we can see space but not time

For a start, we cannot see space either. What we see are objects IN space.
The problem is one can never observe anything directly. We can only receive particles arriving to us from an event. Most commonly we use light. And light, not surprisingly, travels at the speed of light.
According to GMT, time is actually no more than our word for whatever direction we are traveling in at the speed of light in relation to local space.

Let's look at what happens when you try to look at an event while moving away from it at the speed of light - c. The light arriving to you will experience the typical redshift due to the Doppler Effect in the same manner as observed with remote galaxies subject to Hubble's law.
The equations for radial redshift are given as:

$$f_{observed} = f_{emitted} / \sqrt{\frac{1+\frac{v}{c}}{1-\frac{v}{c}}} \tag{11}$$

and

$$\lambda_{emitted} = \lambda_{observed} / \sqrt{\frac{1+\frac{v}{c}}{1-\frac{v}{c}}} \tag{12}$$

As one can easily see, this means that as the velocity v gets closer to c, the observed wavelength tends toward infinity and the solution becomes completely meaningless (due to division by zero) as v becomes c.

As wavelength moves toward infinity, frequency tends toward zero. A wave of infinite length and zero frequency is not a wave at all. It is a static field. In other words - it can deliver no ongoing information about the emitting object.

The situation with looking forward is reversed, but essentially the same. The wavelength becomes zero and the frequency infinite, making it as impossible to use the light to see the emitting event.

Of course "seeing" need not be literal. Any means of observation will do. So what about observing the future or past by use of other, slower than light, particles or objects?
I quick look demonstrates it is not much different.
When looking forward we are already subject the universal speed limit c, thus using slower particles changes nothing. Looking backwards at an event from which we are receding at c using slower than c particles emitting or bouncing from it means said particles simply never catch up with us. We are moving away from the information faster than the information is coming to us.

Thus, the only way to see either backwards or forwards in a direction one is traveling along at c (i.e.- in time) is via faster-the-light communications, forbidden by relativity.

So much for seeing the past or future.

That having been said, the word is still out on tachyons. If, however, they do exist, one could indeed use them to get information - that is, to see - across time.

9 Why we can remember the past, but not the future

The answer to this question seems to escape us specifically because it is so exceedingly simple.
Best way one can put it is: For the same reason you can see your footprints in the sand behind you but not in front of you.
In other words, within GMT causality still applies.

Let us consider a line. We can name its end points A and C and any third point somewhere between them B.
We can say that A is the beginning of the line and C as the end, or the other way around. But what we cannot argue against is that B will still remain sequentially between them.
So if we have a vector pointing from A to C, the sequence will always be A-B-C and no other.

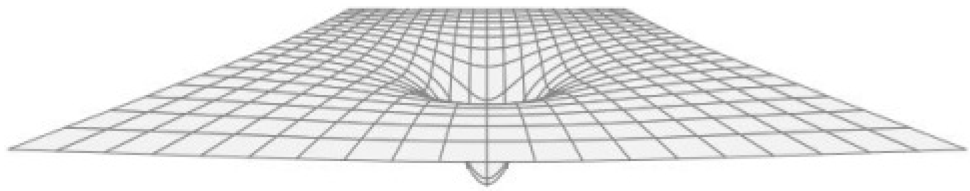
This will be true whether we are talking about time or space.

Thus if an observer is moving from A to C, at any given B between them all points between A and B will "precede" B and therefore can have causal affect with B and all points between B and C cannot.

I suspect this may be what a team of researchers at the Scientific Research Centre Bistra in Ptuj, Slovenia is talking about when they say that time is: "the numerical order of material change", although they seem to draw the opposite conclusions from it (claiming time is completely separate from space).[4]

[4] Amrit Sorli, Davide Fiscaletti, and Dusan Klinar, (2011). Physics Essays

10 GMT and Gravitational Time Dilation



Public domain image

Figure 2

Einstein's General Theory of Relativity tells us that mass warps space. In the common 2-dimensional attempt to visualize this effect shown in Figure 2, we see the grid-lines bend, but more importantly to our case, they also stretch out and move further and further apart from each other inside the gravity well. If we were to now recreate Figure 1 to demonstrate GMT in conditions inside a gravity well, this would have the effect of stretching out the scales on all axes. This would have the same effect as the elongation of distances (or, alternately, as the shortening of the moving object by comparison, as more commonly expressed in relativistic length contraction equations) and of object seeming to move through time slower. This is completely consistent with General Relativity (see Figure 3).

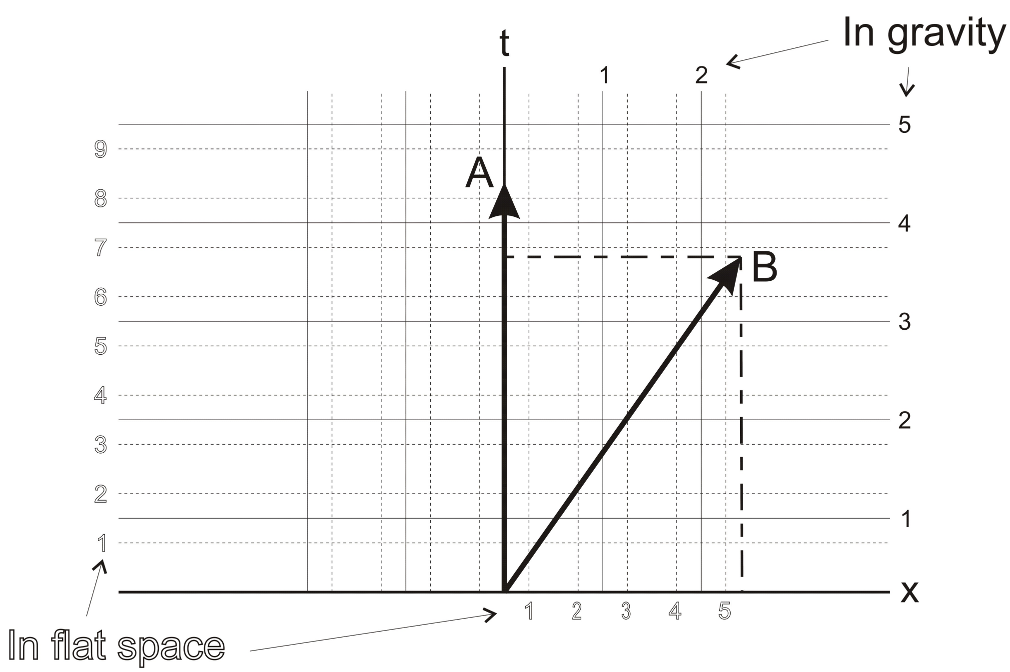


Figure 3

As in Figure 1, object A in Figure 3 is stationary relative to an observer, and object B is in motion. Both are inside a gravity well. Both appear to experience time dilation and length contraction relative to a hypothetical observer outside the gravity well in flat space. B also shows space expansion (i.e. - length contraction) and time dilation relative to A.
In other words, GMT still holds in full consistence with Theory of Relativity in warped space as well as it does in flat.

11 Time motion relative to what?

Since we are speaking of V_t for the observer themselves, an immediate questions that likely comes to the reader's mind is: "motion relative to what"?
The answer is relative to local space.
The debate about the existence or non-existence of Absolute Space goes back to at least the time of Newton and Leibniz, but we need not necessarily stipulate Absolute Space as such. There need not necessarily be a universal frame of reference. One need only move relative to LOCAL space in order for this concept to make sense. By "local space" is meant the space in the immediate vicinity of the object's motion.
Some will feel that is the same as argument for Absolute Space. If that is the case, let it be so. If one must believe in Absolute Space in order to accept these concepts, let them do so.
The important point is one must accept the concept of velocity as axiomatic. It is a property that is an absolute requirement for any physical object in our universe. Moving at c through our four-space is simply synonymous with existing in it. If there is something that does not meet this requirement, it simply does not meet the current definition of physical existence.

Space units may be defined as the distance light travels per unit of time. Or alternately, units of time can be defined as the amount of times that passes while light travels a certain distance. But not both.
GMT gets rid for time as a separate concept, and therefore of the need for separate time units. Velocity remains is as much of an axiom as it was before.

12 On proof

In its current state, GMT is primarily a new interpretation of existing information. As such it may be in same standing as Hugh Everett's so-called Many-Worlds interpretation of quantum physics as an alternative to the older Copenhagen interpretation.
Its usefulness comes from explaining more elegantly some of the existing known phenomenon and addressing some of the unanswered questions from the other models of time.

Unlike the above mentioned quantum physics interpretations, however, GMT is not inherently untestable. Only time will tell (no pun intended) which model will hold in light of new discoveries. Meanwhile it is the author's hope it may at the very least give new direction for further research.

13 Possible scenarios for testability

As stated by Hubble's Law - the space in our universe is known to be expanding at approximately 68 m/sec per Megaparsec.
If time indeed exists as no more than a 4th dimension of space with no one of said four dimensions being unique, then the Geometric Model of Time predicts that time must also expanding at same rate (adjusted for units, where 1 sec. = 1 light-second).
Let us take two objects (see Figure 4) A and B which are stationary relative to each other within space. That is to say there is no relative motion between then EXCEPT due to the expansion of space.

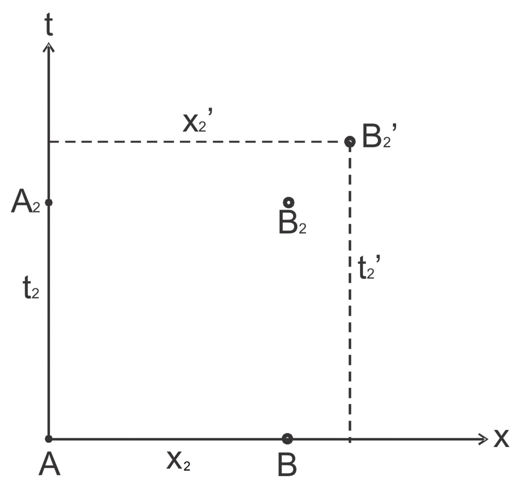


Figure 4

We start with A at $t = 0$ and $x = 0$, and with B distance x_1 away from it and also at $t = 0$ (from A's perspective and using same definition of simultaneity as given originally by Einstein).
Now, let us consider the two objects at time t_2 later.
A is now at $t = t_2$ and $x = 0$ (marked A_2). In a static universe B would now be at $t = t_2$ and $x = x_2$ (shown as B_2). However, in an expanding universe such as ours B would be at some larger distance x'_2.
And if, as the Geometric Model of Time predicts, time is indistinct from space than it should also be further away on the t axis by equal amount at a distance t'_2 (marked by B'_2).
That means that from A's perspective B traveled further in time. That is to

say that to A it would appear as though time is moving faster for B.
Finding confirmation of this would serve as evidence for the validity of this geometrical model of time.

14 Conclusion

A purely geometric interpretation of time and space, where there is no distinction between any of the four dimensions is consistent with Theory of Relativity and other observations, while providing a much simplified and more elegant description then currently generally accepted models.

15 Looking Forward

GMT also opens possibilities for new models or interpretations of other phenomenon, currently under development by the author, such as a reinterpretation of rest mass as a kinetic energy of to the motion of an object through the t dimension, giving $E = Mc^2$ a much more literal interpretation.