Relatively Offset Sphere Mapped Constant Motion Model of Space and Time

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Physical Reality

First-Person vs. Third-Person

This model defines reality from a first-person perspective. What do I mean by first-person? I mean that I, literally, draw a picture of how space and time look if you could see them and then animate the picture. Unlike an equation, one can intuitively understand an animation. In first-person perspective, reality at all levels can be visualized by anyone.

In a third-person perspective the components of reality are assumed to exist independent of one's perception. Their properties are used as rules in relationships that are used to construct descriptions of reality. Because these descriptions are built from a list of rules, they become more difficult for one to visualize as their complexity grows.

In third-person, Motion, Velocity, Acceleration, Mass, Force, Energy, Matter, and so on are, ultimately, just names for different relationships between space and time. But, less attention is paid to defining space and time, than to describing things with the units in which these terms are measured –meters, seconds…etc. These units are assigned mathematical properties which, in turn, are a list of rules defining how these units relate to each other in a given situation. The result of this is that the scientist is removed from reality by many layers of abstraction.

Third-person abstraction is a very powerful tool for engineers and technicians, who directly manipulate reality. However, correctly applying rules to some new problem is a skill that requires visualization of some aspect of reality. This visualization may be better facilitated from a first-person perspective.

A first-person definition of reality starts with perception. This may seem a bit subjective at first, but there are some undisputable rules of perception that are just as objective as any third-person premise. For example, the statement “it is impossible for anything to exist without occupying some extent of space for some interval time” is an absolute truth that cannot be disputed. It is just as valid as saying that no number can be divided by zero. The fact that the properties of change called space and time are constructs of perception through which we experience reality, makes definitions of these constructs no less important than any other concept in Physics.

From this first-person perspective, the absence of space or time ends the observer’s reality. If reality is delivered to our minds in the form of these two properties of change, then defining what these properties are must be the basis of any meaningful definition of reality.

If you agree with the definitions of space and time put forth in the next sections and the application of these definitions to the universe, then it will be possible to visualize an aspect of reality that, to this point, Physics has failed to adequately explain. I’m talking about the constancy of the speed of light in a vacuum. Einstein’s Special Relativity offers an abstraction in the form of the Lorentz transformation as explanation, but as far as I can tell there is no non-mathematical explanation of this phenomenon. The first-person perspective that is offered in this model will allow anyone without a mathematical background to visualize the speed of light as a constant.

Space and Time

Here are my definitions of Space and Time:

Time is lack of past change.

Let’s think about this: If something changes less, then it takes more time than something that changes more. The hour hand of a clock takes more time to move from 12 to 1 than the minute hand. The hour hand changed less than the minute hand. The hour hand occupied more time.

The use of the word “past” in this definition of time is a synonym for "remembered". That is, in first-person, time is something that has already occurred. We don’t actually experience a lack of change before it has occurred, hence, the use of the term “past”.

Space is the extent of future change.

A larger extent of change is possible in more space than in less. A ball can bounce farther in a gym than in a closet. Its motion has more potential extent of change in a larger space.

Space is also something that will or can be traversed in the future. If space is already filled, then we don’t think of it as space.

If we use the term **extent** to describe some amount of space and the term **interval** to describe some amount of time, then we can see how space and time require each other with the following two statements:

We perceive <u>time</u> by assigning the <u>extent</u> of a constant change to some other type of change.

I perceive that it takes longer to paint a picture than to take a photograph because I assigned the extent from my internal perception of time to actions of both the artist and the camera. A **larger extent of events** are assigned to the **slower** artist than to the faster camera.

We perceive <u>space</u> by assigning the <u>interval</u> of a constant change to some other type of change.

I perceive that 100 yards is farther away than 10 yards because there is a longer interval between me and any change that occurs 100 yards away than there is between me and any change at 10 yards away. Fewer events reach me at a distance. There is a **lack of change at a distance**.

I define the word “constant” in the two statements above as an unchanging ratio of space to time between samples at the sample rate of perception. The rate at which our minds sample reality is used as our internal clock. Intervals and extents that we sense are compared with remembered samples of ordered intervals and extents to form a perception of space and time around us.

So, now we have a definition of time as **a lack of past change perceived by comparison of the *extent* of some other change** and a definition of space as **a extent of future change perceived by comparison of the *interval* of some other change**. I admit that these definitions do take some thought to grasp, but they do not require any knowledge of the terms and rules of a formal system of communication. Applying these definitions to reality in the following sections will make them easier to visualize.

The Particle

At this time, for the purposes of our discussion, let us define the term “**particle**” as a point that represents the present location of the center of some object within the universe. This object is our representation of the most basic building block of matter. At this time we know little about it other than it must exist, and therefore, it must also occupy space and time and move relative to other objects.

Now let’s define some properties of our universe. The universe must continue in all directions forever because any object must occupy some space for some amount of time in order for it to exist. If you were outside the universe you wouldn’t exist! Even if you found yourself in a pocket of space and time outside the universe, the lack of space-time between your pocket and the rest of the universe would be undetectable. Since the outside of the universe does not exist, the inside must continue forever. From this fact, we can deduce the following:

Because there is no end to the universe, location, direction, and velocity are all measured relative to other objects. In other words there is no stationary point in the universe against which to measure some absolute velocity.

If an infinite number locations moving at an infinite number of velocities are possible then every object is moving in all directions and at all velocities at the same time.

Now that we have defined the particle as representing the center of the most basic object in the universe, traveling in all directions and at all velocities, let us consider motion of the particle relative to us, the observer. This will allow us to visualize the most basic elements of space and time as two spheres and a point; one sphere in the past, one in the future and a point in the present.

Motion

When something moves, it ceases to exist in one location and resumes its existence in another location. This means that every component (particle) of an object in motion must repeatedly disappear and reappear some distance away until the object reaches its new location.

If a particle left a mark on the space where it appeared for a time in its motion in one direction, then that mark would appear to move away from the object, in the direction opposite of motion. If the particle left a mark at every interval, then there would be a series of marks moving away from the object. (Figure 1) The velocity of the object would determine the distance between each mark and the duration of each appearance of the particle.

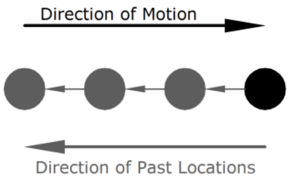

Figure 1

If time is lack of change, then **time is represented by the appearance of the object**. When it appears, the object is not changing. And its location is known.

If space is the extent of change, then **space is represented by the disappearance of the object**. When it disappears, the object is changing location. It is not at the beginning or end of the smallest unit of its extent, but in the indeterminate location in between.

Let's consider the shortest interval of time and the smallest extent of space. These units are determined by an observer. When the sampling rate of the observer reaches its limit, space and time stop being continuous and start to be discontinuous. In other words, the motion of the object will change from being smooth to occurring in jumps as described above. The observer can be another particle. In fact, any observer will be made of particles, whether it is a person or a sensor on some measuring apparatus. Any particle will be affected by another particle at the rate of all particles

The smallest unit of time is the interval that an object appears and the smallest unit of space is the distance that an object travels when it jumps location.

If the object changes location between the smallest units of time, then its change in location is **instantaneous**. There is no unit of time small enough to measure between the smallest units of time.

Likewise, an object is **stationary** during its appearance for the smallest interval of time because there is no unit of space small enough to measure between the smallest units of space possible.

Now let’s consider a particle that is not moving relative to the observer. If we, the observer changed our velocity to match the velocity of the object, then it would be stationary relative to us. No action was applied to the object –only to us, the observer. The particle didn’t stop moving through space just because we changed our velocity to match its. The particle must always be moving through space in both directions. If our velocity is the same in both directions as the object’s velocities, then the object is stationary relative to us. See Figure 2

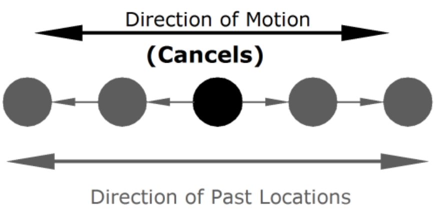

Figure 2: An object moving in two opposite directions at the same time is stationary.

An object must always be moving in all directions at all times at some constant velocity. When its velocity in one direction is greater than its velocity in the opposite direction relative to the observer's velocity, then the object moves in that direction. See Figure 3

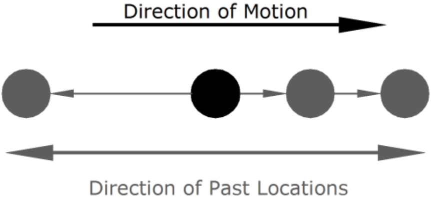

Figure 3: An object moving twice the distance in one direction than in the opposite direction will move in the direction which more distance is covered per interval of time.

Spheres

The smallest extent of motion in all directions is a sphere. Actually, it is two spheres: each section of space between the edge and the center of the first sphere moves through the center. The edge becomes the center and the center becomes the opposite edge of a new sphere.

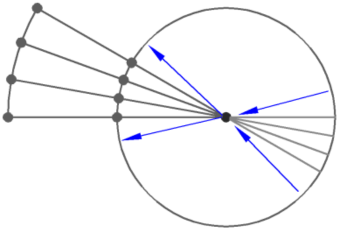

Figure 4

The smallest lack of motion in all directions is a point. When a point jumps location in one direction, it may or may not change location in all other directions at the same time. Since any other object, including the observer, can only be affected by the particle at the instantaneous jump in their own location, any lack of synchronization will not be perceivable.

In other words, there are an infinite number of sections of space between the sphere in Figure 4 and its center –one for every possible direction. Why are all of them synchronized? Well, they may not be. It may take between 1 and 2 jumps of the first section of space for all of the other sections to jump through the center. However, the lack of synchronization is undetectable.

Imagine taking a snapshot of the sphere in Figure 4 every second. If one second passes before each section of space instantaneously jumps through the center, then it does not matter that the one second interval starts at a different time for each section. If each jump can be no further than one second apart and your snapshot occurs at one-second intervals, then you will always see the same amount of change in all of your snapshots.

As long as we the observer are not moving relative to the particle, the space it passes through will be two overlapping spheres with the particle at its center. The radius of the sphere will be the smallest unit of space possible and the time between jumps will be the smallest unit of time possible.

The sphere that collapses is the future and the expanding sphere is the past. We stated earlier that we experience time as something that has already occurred in the past and space as something that may be traversed in the future. Time is an imprint in space where the particle appeared in the past for some interval in its motion. This imprint has the shape of a sphere that expands as the space that once past through the particle moves away from it. Space is what fills the collapsing sphere of the future. For two particles, one section of a past sphere of one object is a section in a future sphere of the second object.

So far, we have looked at the motion of objects that are stationary relative to the observer. That is, motion is the same in all directions and, therefore, cancels. The past and future spheres completely overlap in all directions. But, what happens to the spheres of an object that is moving relative to the observer?

The space that a particle will travel through is a sphere with the particle at its center, but if we are moving relative to the particle that sphere of space will be offset to the direction opposite of motion.

Figure 5 shows the net location of the particle relative to the closest past and future sphere.

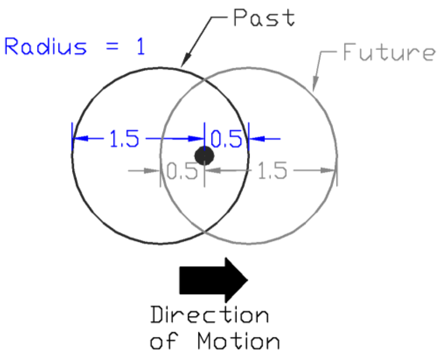

Figure 5: Net location of a particle in motion

The past sphere expanded from the particle pushing space away from it in all directions. Being offset from the center of the sphere means that the new sphere is not in the center of the preceding sphere, but rather to the right of its center. The distance between the last sphere and the one before it is 0.5 to the right and 1.5 to the left. The net effect is motion from left to right. See Figure 6

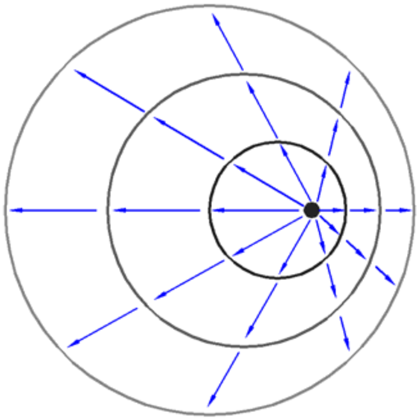

Figure 6: Each new past sphere pushes all other past spheres out. The net effect is motion to the right.

The future sphere shrinks to the particle pulling space toward it in all directions. Since the particle is offset to the left of the center of the next sphere, when it collapses, 0.5 radii will pass through the particle on its left and 1.5 radii will pass through the particle on its right. The net effect is motion from left to right.

The result of the net effect of future and past spheres is the graph in Figure 7. Future and past motion has been graphed to six spheres in both directions. The future spheres are lighter in color and shrink toward the future locations of the particle that are drawn as the lighter colored solid points. The darker spheres represent the past and are expanding away from the past locations of the particle. The present is represented by the black point in the middle.

If Figure 7 were animated, the spheres on the right would shrink to zero and the spheres on the left would expand and increase their number to 12 while the present location would move to the last solid point on the right.

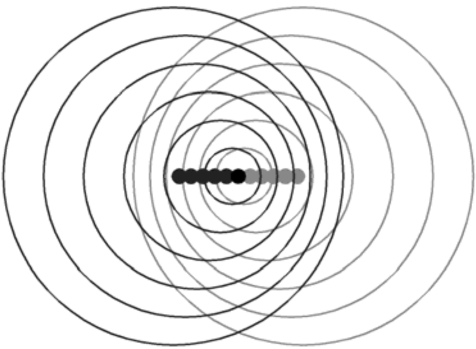

Figure 7: Net location of a particle moving left to right graphed to six spheres in the future and past.

The Speed of Light

At this point I would like to talk about the speed of light. For about the last 100 years it has been shown that, in a vacuum, the speed of light is a constant. This means that regardless of the velocity of the light source relative to an observer, its light always passes that observer at the same velocity. If the source is traveling toward you or away from you it makes no difference, its light always passes you at the same speed.

To better illustrate this, imagine light as a baseball, the light source as the pitcher, and the observer as the catcher. If the pitcher is standing on an open rail car and pitching the ball to the catcher standing beside the track ahead of him, the speed of the ball as it hits the catcher's mitt will always be the same, regardless of the speed of the rail car. No matter how fast or slow the pitcher moves or whether he is moving toward or away from the catcher, the ball will always have the same velocity.

Although the speed of light is constant, its frequency changes with the velocity of its source. If the source has a constant frequency, it will appear to shift its frequency higher if it moves toward the observer and lower if it moves away from the observer. (See Figure 8)

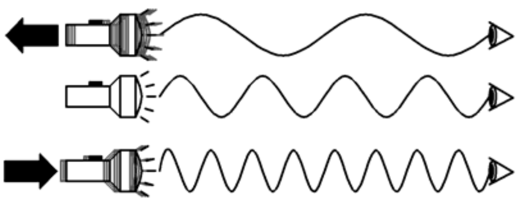

Figure 8: The light source on top is moving away from the observer and its wavelength is longer than the stationary light source in the middle. The light source on the bottom is moving toward the observer and its wavelength is shorter. However, all three rays cross the same distance every second.

Let us apply our definition of space and time to light, in order to visualize the constant velocity of light. We can understand how light always travels at the same velocity if we think of light as a mark left on space by a particle. If light is a distortion in space, then each of the past spheres mark a point on its waveform. As the distance between spheres changes so does the wavelength of the light emitted from the particle. The closer the spheres become, the shorter light's wavelength becomes and we see that the frequency increases in the direction of motion. As the distance between spheres increases, so does wavelength and we see that the frequency decreases in the direction opposite of motion.

Notice in Figure 9 that no matter how close a new sphere is to the preceding one, all of the spheres expand away from their centers at the same rate. This is the key to light-speed's constancy. The spheres positions relative to their neighbors are determined by the particle's past velocity relative to the current velocity ***of the observer***, but their expansion from their centers is always the same. Therefore light moves away from its point of origin at the same speed in the direction of motion as in the direction opposite of motion.

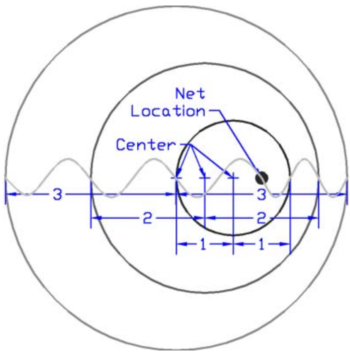

Figure 9: Expanding spheres that mark past locations of an object moving from left to right. They all expand at the same rate even though they're offset to the right.

The animation

I've created an animation that illustrates the concepts presented in this document. It compliments this document and should be viewed by anyone who wants to see this model in motion.

http://rosmappedcmmodel.com/