Universal Specificity Investigation 1: What is Time?

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Time is an important concept to understand properly to make scientific progress, just as understanding earth's location within our solar system, and its spheroidal shape was necessary for progress at earlier times in our history. It will be shown, from this investigative series into the theory of universal specificity, that our current conception of time is holding us back from further discoveries, just as the belief that the earth is the center of celestial motion or flat held our ancestors back.

1. On The Nature of Time

A google search for "define time" returns: time is the indefinite continued progress of existence and events in the past, present, and future regarded as a whole. This definition is circular since past, present and future are concepts that depend on a conception of time. This definition amounts to: time is the continued progress of existence and events in time (plus fluff). This definition is not helpful in gaining insight as to what time is.

If Wikipedia could be considered as representing the common understanding, then the common understanding for time is what a clock reads [1]. This definition is also circular. Clocks are instruments that measure time, which means this definition translates to: time is the thing being measured when measuring time. This definition is not helpful either in gaining insight as to what time is.

The best, and my preferred, definition was found here [2]: *time* is the interval over which change occurs. This gives us a great clue as to what the proper conception of time is. To ensure this preferred definition of time captures the essence of the concept, one has to answer the following question: what facts about reality give rise to the need for the concept time? If one's conception of time is not based on any facts, then the concept itself becomes arbitrary, meaning it is outside reality, and therefore, it is useless in helping us understand reality.

The facts that give rise to this concept are interesting to study. Firstly, changes (to existents) from one state to another are never instantaneous. Despite what quantum physicists might say, it is certain, because of the law of non-contradiction, that both sates (the before and after) cannot exist at the same instant in the same respect. Consequently, this transition from one state to another, lasts for some duration (a series of instances).

Secondly, given the same essential conditions, we know for certain that the same changes last for the same duration because of the law of causality. In fact, changes in duration (the effect) imply changes in essential conditions (the cause). For example, the time it takes your coffee to reach room temperature might change depending on the temperature of the room, the initial temperature of your coffee, and the cup it is in; however, if all essential conditions are the same as before, then the coffee will reach room temperature over the same time interval as before.

These two facts, change is not instant and its duration is repeatable under the same circumstances, give rise to the need for the concept time to help quantify causal relationships. To underscore the need of this concept, without it certain causal relationships would remain unknowable, and therefore, uncontrollable. For example, this conception of time is what allows us to cook our meals with reasonable certainty that it will complete after a predictable duration to our liking. In addition, it gives us a means to figure out why it does not, if it does not—e.g., testing might tell you if a change in altitude caused your timing to be off. As another example, It is what allows us to guide our present actions so that at some instant in time (ahead of now) people can meetup at a preplanned location and time. It is what allows us in countless other examples to control our lives for the better. To sum up, the primary need for this conception of time is to gain better command over reality by improving our obedience to causality. Thus, my preferred definition of time as "the interval over which change occurs" aptly captures the essence of this concept.

Like all measurements, time too needs a standard. The best standards for time, depending on the requirements of precision, are changes that complete at regular intervals, which means the essential conditions are easily made to be invariant resulting in consistent measures of duration. For example, the arc length a sundial's shadow traverses, sand falling to the bottom of an hourglass, pendulum swings in a grandfather clock, or light traveling some known distance can be, and have been, used to measure a standard unit of time. These standards can then be compared to other changes in order to measure their duration. For example, when it takes two turns of an hourglass for your coffee to reach room temperature we say it took two hours. Tomorrow it could take three hours, and because of this standard we know it was longer than the day before and how much longer.

This next point is *critical* to understanding the basis of departure between the theory of universal specificity and the theory of relativity discussed in these investigations. Each method of measuring time can be put in a different situation that changes essential conditions, which changes the duration these instruments are measuring. For example, the sundial could be taken to a different latitude, or the hourglass and grandfather clock could be taken to different altitude, and each would then measure a different duration compared to its original measurement. Likewise, with this conception of time, the light clock that undergoes a change in specific energy measures a different duration than before (covered in detail later in this investigative series). It does not mean time sped up or slowed down, it only means the base units (just units for short) being measured have changed. As an example of changing units, the hourglass at a different altitude is measuring something other than an hour—i.e., the new "hour" being measured does not equal the original hour.

This conception of time challenges the common notion that time is a property of the Universe apart from the duration of any changes taking place, or as a property tied to space (as in spacetime) [2]. At no point do clocks measuring a different duration under different conditions suggest that time is a property of the Universe or as a property tied to space; it only suggests that changes in conditions caused a change in what unit is being measured. In other words, something about the difference in conditions caused the duration of a state change to speed up or slow down, not time itself—there is no time itself. Time, being only a measure of change (to *things*), has no meaning by itself. To generalize that time is everywhere (even by itself), because things could exist and undergo change anywhere, suffers from the fallacy of hasty generalization.

Not to mention, a simple thought experiment, if you are familiar with special relativity, rules out space as being tied to how duration is measured. In this thought experiment, suppose two identical clocks can occupy the same region of space at the same time, as if they phase through each other. For example, say you have two light clocks whose mirrors are parallel and offset sufficiently to miss each other, as shown in Figure 1.

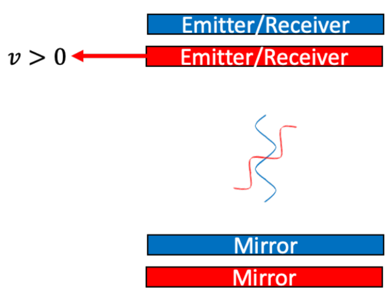

Figure 1. **Two frames in one space.**

Now, if the velocity of these clocks differ from each other, special relativity tells us they measure different intervals for the same physical changes. For example, one clock could measure two hours for your coffee to reach room temperature, and the other could measure three hours. This example is tantamount to two different reference frames occupying the same space. This means two different measures of time by identical clocks occur at the same instant in time and point in space.

What limits us to consider just two overlapping reference frames? Why not all possible reference frames at the same instant in time and point in space? What limits us to consider just a single point in space? Why not consider all possible frames overlapping at the same instant in time and all possible points in space? What limits us to consider just one instance in time? Why not consider all possible frames overlapping in any given instant in time and all possible points in space?

Invoking the method of difference, whereby different effects (different measures of time by identical clocks) occur during the presence of the same antecedent factor (any given instance in time and point in space), proves that space has no effect on how time is measured—i.e., space and how time is measured are independent. The key takeaway is this: time is just a property of things in the Universe—i.e., the interval over which change occurs to *things*—not a property of the Universe as a whole nor an aspect of spacetime.

That is not to say spacetime, as a concept, must be thrown out. As a model, spacetime has predictive value like Ptolemy's planetary model and a flat earth model have predictive value. Using Ptolemy's planetary model, farmers of old were able to accurately plan out harvests; and using a flat earth model, armies of old were able to accurately predict cannon ball trajectories. Likewise, using the spacetime model we are able to accurately predict time measurement changes, which allows our global positioning systems to work.

Just because a model seems true due to its predictive power, however, does not mean the model ought to be accepted as representing a salient fact about reality. There was a time when it seemed true enough that the earth was the center of celestial motion, and a time when it seemed flat too. But of course these models having predictive utility and seeming true does not mean the earth really is the center of celestial motion, nor does it mean the earth really is flat, nor does it mean that time really is a property of the Universe or an aspect of spacetime.

Assuming time is a property of the Universe and an aspect of spacetime prevents us from fathoming important questions, which is holding us back from scientific progress. Some of these questions include: With this new conception of time, are distant simultaneous events truly relative [3]? What is kinetic time dilation if not a rotation in spacetime? What then causes kinetic time dilation? What then causes gravity if not the bending of spacetime? What then causes everything in the same reference frame to be effected by time dilation to the same degree, if not the environment (spacetime) in which everything "sits"? These questions are the focus of further investigations into the theory of universal specificity, and other questions will arise as discoveries are made.

2. Time: Relativity vs Specificity

The next step on this journey is to better understand how this conception of time leads to a departure from orthodoxy.

Special relativity's use of spacetime employs what is believed to be a misconception about what time is. For example, a foundational tenet within special relativity is the relativity of simultaneity [3]. This is a concept where two distant events being simultaneous is not absolute and depends on the reference frame in which the measurements are taking place.

To illustrate this concept, suppose an observer is on a train car (precisely at the center of this car), and suppose he measures initial photons, from two light sources at either end of the car, arrive at the center at the same time. This car riding observer must conclude from his frame of reference that each light source turned on at the same time because the distance each photon traveled is equivalent, and the speed of each is equivalent. This is illustrated in Figure 2.

Now suppose another observer observing the same series of events is on a platform. He observes all this taking place on a moving train car. Both observers agree that the light arrives at the center at the same time—all observers agree about the simultaneous meeting at the center. Because the speed of light is constant, the platform observer must conclude from his frame of reference that the lights turned on at different

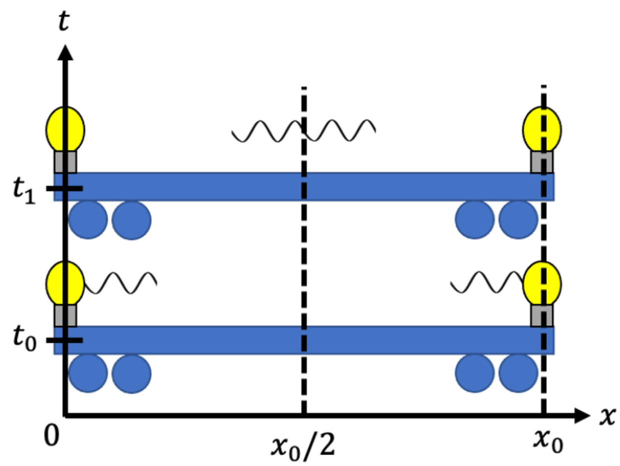

Figure 2. **Train car observer's conclusion.**

times. The light towards the rear turned on first, followed by the light towards the front. That way the photons would arrive at the same time at the center of the car. This is shown in Figure 3.

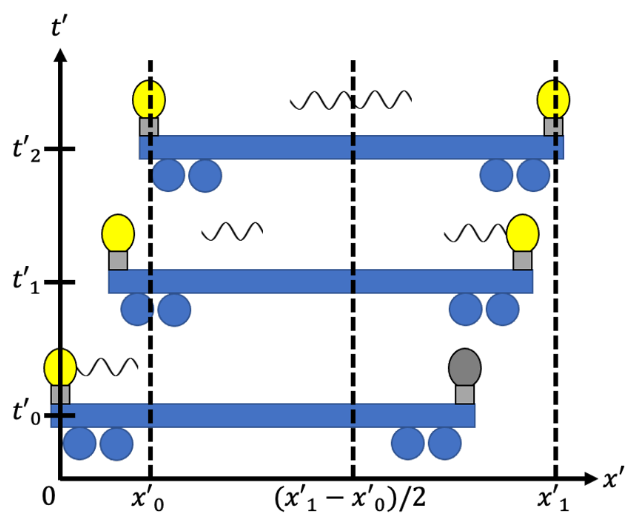

Figure 3. **Platform observer's conclusion**

The simultaneous event in dispute is whether or not the lights turned on at the same time. One observer reports yes, and the other reports no (a third could also report no, but in the opposite sequence). Both observers are correct in their observations, which seems like a contradiction. Observations are always above reproach; however, interpretations and conclusions based on observations are never above reproach.

Presently, it is impossible to determine which (if either) observer's conclusion is true. Neither observer observed the instant the light was emitted, only the physical trace left behind from the emission, which takes time (and distance) to reach the observes from the source. One observer measures the event in the middle, and using a predictive physics model, he predicts the sources' emission time based on their location. The other observer measures when the light reaches the platform, and using the same predictive physics model (but using a different state for the train car), he predicts (1) that the light arrived simultaneously at the center of the train, and (2) they were emitted at different times.

Even if we cannot determine which (if either) prediction is true, it is at least certain that both conclusions cannot be true. The lights turning on at the same instant and not at the same instant cannot both be true because the law of non-contradiction tells us something cannot both be and not be at the same time in the same respect.

There is a reason both observations are made, and there is a reason why each unquestionable observation leads to contradictory conclusions, for which both cannot be true. That reason is each observer is using different units of measurement for measuring time (and length), and yet for the setup of this example it was tacitly assumed they were using the same units. This would be like comparing how many minutes it took for an event to unfold, and comparing it to how many seconds it took, but without a unit conversion.

In addition, the need for a conversion goes undetected because identical instruments are making the measurements in both reference frames, and it assumed they are measuring the same unit; therefore, each different unit is given the same name. Indeed, if either observer brought with them identical instruments that serve as standards of measurement, neither observer would detect a change in their experience. The atomic clock would appear to tick the same, the kilogram would appear to have the same mass, etc. The only evidence of a difference is that each observer disagrees about the simultaneity of the lights turning on.

It was shown in the previous section, measuring devices can measure different units under different conditions. A change in reference frame causes a change in units in such a manner that makes the observers unable to perceive the unit change directly. These unit changes are responsible for the contradictions between predictions about the simultaneity of distant events. Contradictory predictions implies an error in the model used to make those predictions; therefore, a model update is required to resolve these contradictions and improve our conclusions.

It is not common practice to consider that identical measuring instruments, in different reference frames, are actually measuring different units. If one thinks of it in this way, it is only possible (presently) to determine how the units differ between reference frames, via the Lorentz Transformation [4], but not which one is universally correct/incorrect. From our earlier example, the train car riding observer knows from this transformation, exactly what the platform observer must observe and conclude from their frame of reference, and vice versa. This transformation allows for "empathy", but fails to reveal a universal standard, which would require a reference frame that is universally stationary, termed here the *universally stationary frame* (USF).

Physics orthodoxy holds that a USF does not exists. Others believe even if such a frame existed, no one could know it. Both groups agree that the best one can expect is for one observer to "empathize" with another, and then for each to abandon as futile any attempt to discover absolute truth. Any reference frame is concluded to be as good as any other, for the purpose of serving as "universally stationary," and any selection is arbitrary, much like selecting a ground is arbitrary in circuit analysis.

This belief that the USF does not exist, because it is impossible to measure, confuses ignorance (a cognitive state) with a property of reality (a physical state). This confusion between cognition and reality has become common practice in modern physics, and it deserves immediate challenge whenever it occurs. In this case, it is certain, because of the law of identity, that everything that exists must exist in any instant in some state. The states may change from instant to instant, but the fact remains that all existents exist in any given instant in some state.

In our train example, as an example, at some instant in time, both light sources were off. In a later instant in time, one light was on (or both). This much is known to be true, even if the full truth cannot be determined. If we are not to reject the law of identity, and throw ourselves outside the domain of logic and reason (and science for that matter), then this implies the USF exists even if it proves impossible to determine which frame it is. If the lights on the train turned on in some specific sequence, as the law of identity dictates, then the reference frame able to predict that sequence using current models is the USF we seek.

I am not alone in my conviction that a USF exists. Not all physicists ascribe to the orthodoxy position regarding the USF, but those that believe in the existence of a USF are an extremely small minority. A smaller number still are conducting research into relativistic theories with a USF [5], [6], [7] and how to test these theories [8]—which includes this investigative series into specificity.

In fact, Lorentz's Ether Theory (LET), which predates special relativity, was the first to posit a USF to explain the failure of the negative ether drift experiments, and the Lorentz Transforms (the same transforms used in relativity) were created on the basis of this theory. The LET is currently indistinguishable from special relativity, in that LET is like special relativity except with an unknown preferred frame. Test have been devised in an attempt to measure the one-way speed of light, which would allow LET to be distinguished from special relativity, but no test as yet succeeded and it is largely deemed impossible [10]. This theory significantly fell out of favor when it failed to find an acceptable theory of gravity as Einstein's general relativity succeeded in doing so. In addition, many physicists felt uncomfortable with the idea of an undetectable ether being required for light to only be constant in the USF, while relativity required no ether (light is always constant in any inertial frame).

In a way, these investigations pick up Lorentz's mantel (without an a need for an ether) and completes the journey to a theory of gravity, which allows for a test to determine which frame is the USF.

3. Conclusion

In conclusion, all observations are beyond reproach, and the theory of universal specificity agrees with most (if not all) predicted observation relativity makes. However, specificity rejects many of the conclusions made in relativity, which are drawn from those observations, and many causes of those observations posited by relativity. For example, specificity makes use of what knowledge we have, and asserts that events occur at specific instances in time and space and only appear relative because of a model error in relativity involving an undetected change in units being measured by our instruments. This implies that events at distance have a certain sequence in which they occur and their simultaneity is not relative, but only appear relative. The one frame that predicts the true sequence, given current models, is the USF. This is the primary departure of specificity from relativity, which ultimately resulted from a different conception of time.

In a way, these investigations pick up where Lorentz Either Theory left off, with the exception of having a stronger foundation. This stronger foundation is based on a proper conception of time. If was found that time properly conceptualized is the interval over which change occurs, and is not a property of the Universe apart from physical changes to things in the Universe. Additionally, it was revealed that changes to this interval over which change occurs implies a change in conditions that caused it. This proper conception of time led to the conviction that a USF must exist because the law of identity would be violated otherwise.

This investigative series aims to develop, among other things, a means to determine which frame is the USF. However, many tools and concepts need to be developed (in this investigative series) before a method can be developed to determine which frame is the USF. The next step in this series is to understand the implications of the existence of a USF, which is the topic of the next investigation.

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