Einstein's Mysterious Clocks: a Case Study in Sympathetic Magic

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Abstract: When we want to measure something we use a measuring device appropriate for the quantity we want to measure. For instance, if we want to measure the width of a doorway we could use a tape measure or a ruler. Space is not defined by what is used to measure it; space exists independently of the measuring device. Similarly, if we want to measure the pressure in a car tyre we use a pressure gauge. Pressure is not defined by what is used to measure it; pressure exists independently of the measuring device. In the case of measuring time we can use a clock or a watch. A measuring device is used to measure something other than itself. Any measuring device invented to do nothing but measure itself or copies of itself is unnecessary. No measuring device defines what it is used to measure. What it is to be measured is what motivates the invention of the measuring device in the first place. Strangely, in developing his theory of relativity, Einstein used his clocks to define time and thereafter spoke of his clocks. In other words, Einstein's clocks only ever measure themselves so that clocks running at different rates means, for him, time running at different rates. In doing so Einstein detached his clocks and watches from physical reality and created a fantasyland in which clocks and watches reign supreme. His moving clocks running at different rates constitute moving times running at different rates.

1. INTRODUCTION

In his famous paper in 1905 introducing his special theory of relativity, Einstein placed great emphasis on his mysterious clocks. In section 1 of his paper he presents a tortuous discussion of how his clocks and watches define time. Yet clocks were invented to measure something that is not the clocks themselves. Clocks and watches do not define time: clocks and watches are not time. Nevertheless Einstein asserted[1]:

> It is necessary to have time defined by means of stationary clocks in the stationary system, and the time now defined being appropriate to the stationary system we call it "the time of the stationary system."

Besides clocks in his stationary system, Einstein talks of his clocks in moving systems. According to his theory, clocks in his moving systems tick at a different rate to clocks in his stationary system. Since he defines time by means of his clocks and watches, there is no difference between the ticking and tocking of clocks and time itself, so Einstein concludes, since his clocks run at different rates, time itself in his moving system runs at a different rate to time itself in his stationary system. In their book, Einstein and Infeld write[2]:

> We can equally imagine a moving clock having a different rhythm from one at rest.
> ⋮
> We can well imagine that a moving clock changes its rhythm …

In other words, in Einstein's world view, moving time changes its rhythm. One can only wonder how time can move with respect to time: there is stationary time (his stationary system clock) and a moving time (his moving system clock). Einstein

confounds clocks for time. A clock is a measuring device, but time is not a measuring device and a clock is not time; just as a pressure gauge is a measuring device, but pressure is not a measuring device and a pressure gauge is not pressure.

From his phantasmagorical premise that clocks define time, Einstein created a fantasyland. Oddly, his imaginary world has captured and corralled much of the enterprise that used to be called physics. Consequently, a great deal of what is now called physics is nothing more than mysticism.

2. SYMPATHETIC MAGIC AND EINSTEIN'S CLOCKS

The Law of Similarity is an element of sympathetic magic, in which cause and effect are sympathetic with one another in that "like produces like, or that an effect resembles its cause."[3] Charms based upon the Law of Similarity are called Homoeopathic Magic,[3] which "commits the mistake of assuming that things which resemble each other are the same."[3] In the case of his clocks Einstein took the Law of Similarity into an added dimension by making his clocks the same as time, by defining time by his clocks. Einstein made the mistake that clocks and time are the same. By sympathetic magic, sticking pins into a doll resembling a particular person is thought to affect that person. In like fashion, what Einstein says happens to his clocks happens to time, by sympathy. His clocks are effectively effigies of time which are affected by what happens to his clocks.

Einstein does not restrict his time pieces to mechanical clocks and watches. In their book Einstein and Infeld write:[2]

> Any physical phenomenon may be used as a clock, provided it can be exactly repeated as many times as desired…. All clocks, from the simple hourglass to the most refined instruments, are based on this idea.

The pendulum clock is certainly another clock. You might recall that Galileo once measured the period of swing of a pendulum by using his heartbeat; the units of time then being Galileo heartbeats. Galileo used his heartbeat as a clock. In the case of the hourglass the unit of time is an hour. But the hourglass must first be synchronised with what an hour is by ensuring that the amount of sand inside it takes an hour to drain out under the force of gravity at the Earth's surface where it is used.

3. EINSTEIN'S SYNCHRONISED CLOCKS

Although synchronising clocks and watches is a matter of common sense to most people, in his theory of special relativity Einstein makes a great fuss about synchronisation of his clocks. When his clocks are not synchronised is time running at different rates for his clocks? After all, Einstein defined time by his clocks. If you and I determine to meet someplace at say 2:00pm sharp but your watch is running at a much slower rate than my watch, you'll arrive late. By my watch I'll be at the meeting place at 2:00pm but you won't. I'll wait. You finally show up. Your watch reads 2:00pm; mine reads 2:17pm. You're late! We discover that your watch is defective and is running slow. So we decide that you will take your watch to the watchmaker to have it mended so that it runs true. Whilst your watch was running slowly was time passing more slowly for you as you made your way to our meeting place, or was it

really all just a problem with your watch? What if your watchmaker finds that your watch is actually running true so that mine is running too fast? Is time running faster for me than for you as I made my way to our meeting place? Am I aging faster than you? Timepieces often suffer from defects causing them to run at different rates, but that does not mean that time flows at different rates for the owners of the timepieces.

Mark Twain[4] anticipated Einstein's arcane clocks and watches by about 35 years:

> After being cleaned and oiled, and regulated, my watch slowed down to that degree that it ticked like a tolling bell. I began to be left by trains, I failed all appointments, I got to missing my dinner; my watch strung out three days' grace to four and let me go to protest; I gradually drifted back into yesterday, then day before, then into last week, and by and by the comprehension came upon me that all solitary and alone I was lingering along in week before last, and the world was out of sight. I seemed to detect in myself a sort of sneaking fellow-feeling for the mummy in the museum, and a desire to swap news with him.

Let both our watches run true and we synchronise them so that they read the same time. I'll stand on a railway platform and you'll take a seat on Einstein's fast train that flashes past me. According to Einstein, who used fast trains a lot in his arguments, your watch will run slow because you are moving. Hence, you are aging more slowly than me, because clocks and watches (and heartbeats) define Einstein's time. On the other hand, you are sitting still inside the train and I flash past you in the opposite direction. According to Einstein, as far as your watch is concerned, my watch is moving so that my watch is running slow. Once again, Einstein's watches define time itself, so who is aging more slowly, you or me? Or are we aging at the same rate, our watches themselves going haywire? Could it be that moving watches don't go haywire at all and that we age at the same rate, like everybody else? According to Einstein, the effects are reciprocal so that both watches are running more slowly by the same amount; so we must both be aging more slowly, due to the relative motion, but according to ourselves respectively, we are not aging more slowly by noting what our own watches indicate.

There is a paradox here, but according to Einstein and his followers, there is no paradox. The problem is with us, they claim; we just don't understand. For example, here is what Schutz[5] says in Chapter 1 of his book:

> Newcomers to SR, and others who don't understand it well enough, often worry at this point that the theory is inconsistent. … but like all 'paradoxes' in SR, this comes from not having reasoned correctly. … Unfortunately, the careless student (or the attentive student of a careless teacher) often comes away with the idea that SR does in fact lead to paradoxes. This is pure nonsense. … (For the student who really wants to study a paradox in depth, see 'The twin "paradox" dissected' in this chapter.)

What is the twin paradox? Here is what Einstein[1] says of it in section 4 of his 1905 paper:

> If one of two synchronous clocks at A is moved in a closed curve with constant velocity until it returns to A, the journey lasting t seconds, then by the clock which has remained at rest the travelled clock on its arrival at A will be $\frac{1}{2}tv^2/c^2$ second[s] slow.

Let the point A be on Earth. There are synchronised twin clocks there. Call the clocks C_1 and C_2. Let the twin clock C_2 be moved "*in a closed curve with constant velocity until it returns to A*." Then according to Einstein a time t seconds has elapsed according to clock C_1 but a lesser time has elapsed on the moving clock C_2. The twin clock C_2 is less than t by the amount $\frac{1}{2}tv^2/c^2$ seconds, where v is the constant speed of clock C_2 and c is the constant speed of light. In other words a man holding clock C_1 in his hands has aged more than a woman travelling with clock C_2 in her hands. Let these two people be twins. Thus, upon return from her fantastic voyage, the twin holding clock C_1 is older than the twin travelling with clock C_2 in her hands, and so the clock C_1 is older than the twin clock C_2. Let's put in some definite numbers to clarify, using the terms given by Schutz himself in his book[5]. Diana and Artemis are the twins. Diana holds Einstein's clock C_2 and undertakes the fantastic voyage on a rocket ship travelling at the speed $v = 0.96c$ where c is the speed of light; c = 300,000,000 metres per second. Upon her return to Earth she finds that she has aged 14 years and Artemis, who holds Einstein's clock C_1, has aged 50 years - all according to the clocks, with clock C_1 having aged 50 years and twin clock C_2 having aged only 14 years. Einstein's clocks, defining time as they do, mean that time flowed at different rates for Diana and Artemis during the fantastic voyage, and also for the clocks themselves.

But what is a year? It's the execution of an Earth-Sun orbit. So for Diana, Earth and Sun executed 14 orbits whilst for Artemis, Earth and Sun executed 50 orbits. However, Earth and Sun can't execute different numbers of orbits; they can only execute the same number of orbits no matter how Diana travels on her rocket ship. Einstein's clocks are truly quite magical in making Earth and Sun execute 14 and 50 orbits for the one and the same fantastic voyage. When advocates of Einstein's theory wax lyrical on the twin paradox not being a paradox, they all talk about Einstein's clocks and carelessly forget entirely what a year actually is. Being surrounded by their trees they can't see their forest.

4. EINSTEIN'S CLOCKS AND GENERAL RELATIVITY

According to Einstein's general theory of relativity a clock on the surface of Earth runs faster as it is raised because, he says, the stronger the gravitational field the slower the clock runs. Since clocks define Einstein's time, this means that time runs faster with increasing altitude. Now the hourglass and the pendulum clock are clocks. As they are raised above Earth's surface they actually run more slowly, because the gravitational field gets weaker, and if they are inside the International Space Station orbiting Earth, they stop altogether, due to weightlessness. But has time then stopped for the occupants of the space station? Not at all! Time flows as usual for the astronauts and cosmonauts. Now the space station is orbiting Earth at some constant speed. According to Einstein's special relativity the clocks in the orbiting space station run more slowly, so the astronauts and cosmonauts age more slowly. The hourglass and the pendulum clock don't even run inside the space station so how do they manage to run more slowly? Do they run backwards? Of course not!

5. CONCLUSION

Einstein is wrong - clocks do not define time. When clocks run at different rates the problem is with the clocks, so they need to be repaired or adjusted by a clockmaker.

Time does not run at different rates just because clocks run at different rates, whether the clocks are stationary or moving. Einstein's clocks are effectively effigies of time that are governed by relativistic charms in accordance with the precepts of sympathetic magic. Magic, however, is not science, even if it is draped in mathematical formulae and neat graphs called spacetime diagrams. Einstein's clocks are mysticism and magic wrapped up in mathematical formulae that give his theory of relativity the façade of science. No wonder the mathematical garb of the theory of relativity is also incoherent.[6-8]

Note: This article is the seventh in a series[9-14].

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