Chapter 37

**THE FAILED CONFIRMATIONS OF TIME DILATION
AND THE RELATIVISTIC DOPPLER EFFECT**

A. Origin of the concept of Time Dilation

In 1900, Larmor introduced the unobserved aether concept of time dilation in his

treatise "Aether and Matter." (Zhang, p. 175)

> "According to Larmor, a clock moving with a velocity v through <u>ether</u> will go
> slower than a stationary clock by a factor of $\sqrt{1 - v^2/c^2}$." [1] (*Id.*)

In 1905, Einstein attempted to convert this absolute concept into a relative one by

substituting a <u>relative velocity</u> v between two inertially moving bodies in place of the

absolute velocity v relative to the non-existent aether.

In section 4 of his 1905 Special Theory, Einstein referred to the "Physical

Meaning" of the Lorentz transformation equations "in respect to …moving clocks."

(Einstein, 1905d [Dover, 1952, p. 48]) Einstein's definitions of a 'clock' and of 'time

dilation' were very broad. For Einstein, a clock was any <u>periodic process</u>, such as the

oscillations of an atom. 'Time dilation' meant the increase in time interval between two

periodic events, such as two ticks of a clock or two waves of a light ray, because of a

relative velocity. In other words, any relative velocity mathematically resulted in the

decrease in <u>frequency</u> of such periodic events.[2] (see Gill, p. viii; Einstein, *Relativity*, pp.

41 – 42)

Why did Einstein adopt Larmor's and Lorentz's artificial aether concept of time

dilation for his 1905 Special Theory? Because he needed it in order to make his

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[1] This concept was also asserted by Lorentz. (French, p. 146; also see Goldberg pp. _____)
[2] To Einstein, 'Time Dilation' also meant the application of the Lorentz transformation for duration, to time intervals from one inertial reference frame to another. (see Gill, p. viii)

mechanics Special Theory for the absolute velocity of light appear to work mathematically.

B. Einstein's Relativistic Doppler Effect

After Einstein adopted the aether concept of Time Dilation for his Special Theory, he had to attempt to find some empirical confirmation that this concept actually exists. In 1905, the most obvious example of a change in the frequency of a periodic process caused by relative velocity was the classical Doppler effect of light. (see Chapter 7) However, Einstein's analysis of the Doppler effect of light was quite different than the classical explanation. In section 7 of his 1905 Special Theory Einstein described his relativistic Doppler principle of light. (Einstein, 1905d [Dover, pp. 55 – 56])

Einstein imagined a distant source of light waves in space with an emitted wave frequency f, which light waves are ultimately received by an observer. Because of an assumed relative velocity between the distant source and the observer, he applied the Lorentz transformation equations for distance and time to such light waves, and determined an equation for the description of such received light waves by an observer who was relatively at rest. Einstein then imagined that the observer moves at velocity v relative to the light source. [3] Einstein then determined another equation which *a priori* described the frequency of the light waves when they were perceived by the observer. Einstein concluded that "this is Doppler's principle for any velocities whatsoever." (*Id.*)

According to Einstein, before the observer can know the constitution of the waves which he is observing at relative rest, he must first apply the Lorentz transformation to the wavefronts emitted by the source, but before he can do that, he must know their

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[3] This assumption of an observer moving at a certain velocity is identical to the classical explanation. (see Chapter 7)

frequency when emitted by the source. However, before the observer can determine the wavefront frequency which he is going to perceive as a result of relative motion, he must first know his velocity v relative to the distant source. All of these unknowns can only be inferred from observing a classical Doppler shift. Therefore, Einstein's relativistic Doppler theory is both circular and impossible to compute unless and until an empirical Doppler shift is first observed and analyzed by classical methods.[4] For these reasons, Einstein's relativistic Doppler equations are meaningless in any practical sense.

What was Einstein really asserting? He was mathematically asserting that the relative velocity of the source and the observer (at a distance) caused the distance interval and the time interval between the wavefronts emitted by the light source to physically expand.[5] This in turn caused such wavefronts to be received by an observer less frequently than was assumed by the classical theory. Theoretically, there should be a lesser blue shift and a greater red shift than was being interpreted by the classical method.[6] Mathematically, the magnitude of this relativistic effect increased with an increase in relative velocity.

But how can the distance between radiation wavefronts physically expand during their propagation through empty space? Einstein did not enlighten us as to how this physical process (this action at a distance) occurs. Radiation wavefronts are not matter like the longitudinal arm of Michelson's apparatus, and they have nothing to do with the kinematic motions of matter. So how can the Lorentz transformations for moving matter have anything to do with them?

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[4] After such observation and analysis, Einstein's relativistic Doppler equations merely attempt to modify such empirical magnitudes in an *ad hoc* way.
[5] Is this not the same as asserting that the wavelengths of light physically expand or become longer?
[6] This theoretical effect has also been described as a dilation (slowing down) of time for the observer.

Chapter 37 The Failed Confirmations Of Time Dilation/Dopper Effect

In the classical theory, when two luminous objects are approaching each other, the distance between their wavefronts decreases relative to the observer and thus they are received more frequently than when at rest. How can the distance between such wavefronts decrease with such relative motion and expand because of such relative motion (in Einstein's theory) at the same time?

Also, if the distance between emitted wavefronts expands to a certain magnitude relative to an observer on Earth (depending upon relative velocity), then they must also physically expand to a specific magnitude relative to every other observer in the Cosmos all at the same time, depending upon their relative velocity and relative direction of motion. This, of course, would be an impossibility for the same reasons as described in Chapter 10A. Einstein's relativistic Doppler theory is yet another example of his philosophy: "that everything that is mathematically true [or possible] must have a physical counterpart." (see Dingle, 1972, p. 125)

With the classical Doppler effect of light, the spectral shift is <u>observed</u> to be <u>directly proportional</u> to the relative velocity (or 'linear' in mathematical terms). Whereas, with the relativistic Doppler theory, the <u>observed</u> spectral shift theoretically is not directly proportional to the relative velocity, but rather takes a much different arcing geometrical shape.[7] (see Figure 23.1) Is not the contradictory observed effect empirical evidence that Einstein's relativistic equations are not correct?

This arcing shape results from the application of the Lorentz transformation, and its purpose is a mathematical one: to keep the relative velocity of the two luminous objects always below the speed of light. But this result in turn contradicts current

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[7] The relativistic red shift for radial velocity is not linear, but rather curves and always remains under c. (see Harrison, pp. 231 – 240)

estimates of the radial velocity of remote galaxies; their interpreted radial velocities relative to Earth are far in excess of the speed of light. (see _____)
Something is amiss. It turns out that such contradictory result was not even necessary for redshifts. Why? Because Einstein's relativistic speed limit of *c* for the addition of two velocities in the <u>same</u> direction does not theoretically impose a speed limit on two luminous bodies separating in space in <u>different</u> directions.

Does Einstein's relativistic Doppler principle assert that information can be transmitted faster than the speed of light, and even instantaneously? The answer is 'yes.'

Einstein's relativistic Doppler principle only requires a <u>relative velocity</u> v between two inertial bodies (a distant light source and a local observer), light waves of frequency f at the source, and the Lorentz transformation equations. Thus, the relativistic Doppler effect perceived by the observer (the shift of the dark spectral lines) is *a priori* due to the combination of the motion of the observer <u>and</u> the motion of the distant light source at the same time. In other words, the observed effect theoretically results because of their simultaneous relative velocity; but never because of their unique velocities considered separately, nor because of the distance/time interval delay of *c*.

Resnick asserted that "the theory of relativity introduces an <u>intrinsic</u> simplification over the classical interpretation of" the Doppler effect…in that the two separate cases which are different in classical theory, namely an observer moving relative to a source and a source moving relative to an observer "are <u>identical</u> in relativity." (Resnick, 1968, p. 91) This claim of identity has also been made by many other relativists. For example, "the relativistic result is a kind of <u>unification</u> of the moving-

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source and moving-observer results…"[8] (French, p. 137) It follows from the above that

(in Einstein's theory) the relative velocity of the source and the observer produces one

and the same effect (either a blue shift or a red shift), and that either the "observation of

the movement [motion] is <u>immediate</u> in both cases, or it is delayed in both cases."

(Dingle, 1972, p. 216)

We know from experience that observation of such confirmed motion in

Einstein's theory must be immediate. Why? Because:

> "We know that, with respect to a distant star, the orbital motion of the Earth round
> the Sun causes an alternation of approach and recession. The Doppler effect
> corresponding to this is observed to synchronise with the orbital motion in every
> case, so we know that, when the observer moves, the effect is seen
> immediately…That means that the effect must also be seen <u>immediately</u> when the
> star moves, otherwise there would be an observable distinction between the two
> cases." (Dingle, 1972, p. 216)

Therefore, according to Einstein's theory, "every Doppler effect observed is a result of a

motion occurring at the time (instant) of observation, no matter how far away the source

of light may be." (*Id.*, p. 217)

Let us analyze the implications of these assertions and empirical conclusions. If

the relativistic Doppler effect is only due to the combination of the separate velocities of

two relatively moving bodies, then the velocity of the light source, no matter how far

away, must have an immediate, instantaneous and simultaneous impact on the locally

observed effect. This result violates Einstein's relativistic addition of velocities: that no

transmission of information (vis. the velocity of a distant star) can exceed the speed of

light.

We have devised a simple and straightforward test to determine the validity or

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[8] The relativists also attempt to justify the relativistic effect because of its "special <u>symmetry</u> that the
previous result lacks." (French, p. 137)

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invalidity of this simultaneous transmission. If the observed spectrum shifts between the

solar orbiting Earth and two nearby binary stars in reciprocal orbits are consistent and

correlate with current observations, then such observed shifts must be a time delayed

classical Doppler spectrum shift that we are observing. (see Figure 23.1B) Why?

Because our current observations of such binary stars also portray the relative motions of

the binary stars that occurred many light-years in the past, due to the distance/time

interval delay of c. On the other hand, if there is no such correlation then such observed

shift must be a simultaneous relativistic Doppler spectrum shift due to current distant

relative motions of the binary stars which we currently observe because of the

distance/time interval delay of c. Our money rides on the time delayed classical Doppler

shift.

The relativistic Doppler concept implies that, without an aether, the separate

analysis of the source's motion and the observer's motion are always meaningless,

because there is no way to determine which body in space is moving. However,

observations in local space belie this assertion. For example, the alternations of blue

shifts and red shifts observed in light from a distant star is directly correlated with the

Earth's observed solar orbital motion, and can only be rationalized on the basis of such

local observation. (see Dingle, 1972, p. 216; Figure 23.2A) Likewise, the similar

spectral oscillations of one observed binary star orbiting another star can only be

explained based on such distant time delayed observations. [9] (see Zeilik, p. 315; Figure

23.2B)

The relativistic Doppler concept also implies that the finite transmission velocity

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[9] Other similar situations where the observed motion of a luminous body can be demonstrated to be the
cause of its spectral shift include the observed rotation of solar sunspots, the observed rotation of a planet,
and spectral shifts from comets moving toward and away from the Sun.

of light and the resulting distance/time interval delay of c are irrelevant to the effect.

How then does it explain the facts that: 1) the Earth does not change its motion relative to a distant exploding star (a supernova), and 2) we do not perceive a large blue shift associated with the supernova's fragments approaching the Earth at about 2,000 km/s until we observe the supernova itself (which occurred thousands of light years ago). This time delay for the local observation of such blue shift also contradicts the assertion of the relativistic Doppler effect that the relative motion of the distant light source is part and parcel of every Doppler effect; in other words, that the relative velocity of the light source is observed simultaneously with every Doppler effect.

Einstein and his followers imply that the relativistic Doppler effect is a necessary consequence of Special Relativity. Professor Dingle, in his extensive treatise on the Doppler Effect, concluded just the opposite: "there is no necessary relation at all between the relativity theory and the Doppler effect." (Dingle, 1961, p. 21) Why? Because:

> "[Einstein's] postulate of constant light velocity speaks only of the *velocity* of light; it does not require that light shall even show a periodity [a frequency of light waves]." [10] (*Id.*, p. 22)

> "Einstein's theory of necessity makes a complete divorce between the velocity of light and its frequency, because the velocity is independent of the motion of the source or receiver and the frequency [Doppler effect] varies systematically with the relative motion of those bodies." (*Id.*, p. 119)

> Thus "it would be entirely consistent with Einstein's theory if there were no Doppler effect at all—i.e. if motion had no effect on the observed frequency of light..." (*Id.*, p. 22)

In his 1907 Jahrbuch article, Einstein implied that an experiment conducted by J. Stark in 1906 confirmed his relativistic Doppler concept. In Stark's experiment, radiation

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[10] Whereas, the empirical Doppler effect of light interprets the frequency of received light waves to infer the magnitude and direction of relative linear velocity between luminous celestial bodies.

emitted from rapidly moving hydrogen ions (called canal rays) created spectral lines that

shifted position during the experiment. Stark interpreted this shift of position to be a

Doppler effect. Einstein, in turn, considered the atomic oscillation process and the

frequency of the spectral lines emitted by the ions to be a clock with a certain 'proper'

frequency. (Einstein, 1907 Jahrbuch [Beck, pp. 262 – 263, 266 – 267]) When Einstein

applied the Lorentz transformations to this 'proper' frequency he concluded:

> "the effect of the motion on the light frequency that is to be ascertained by the
> observer is not completely given by the Doppler effect. The motion also reduces
> the (apparent) proper frequency of the emitting ions in accordance with the
> [Lorentz transformations]." (*Id*., p. 263)

Einstein's mathematical conclusion is, of course, dependent upon his dubious

assumptions that the Lorentz transformations are valid and that they should be applied to

Stark's experiment. This so-called confirmation is at best circular; Einstein's relativistic

Doppler effect was intended to empirically confirm his relativistic concept of Time

Dilation which was mathematically created by his Lorentz transformations which caused

the relativistic Doppler effect, etc., etc. Again, circular reasoning is not very convincing!

In fact, there is no experimental or observational proof that the relatively small

Doppler velocities observed in local space are anything other than classical Doppler

effects. Why? Because any such theoretical variations between classical Doppler effects

and a relativistic Doppler velocity are too small to detect or "make themselves evident in

practice." (Einstein, *Relativity*, pp. 49, 50) How convenient for Einstein's relativistic

Doppler effect!

T. P. Gill, who wrote the book entitled "The Doppler Effect" in 1965, concludes:

> "the actual amount of <u>evidence supporting the relativistic Doppler effect formula
> is not very great</u> at all. <u>It is accepted because the remainder of the [relativistic]
> theory has to be accepted</u> on the basis of…experimental evidence." (Gill, p. ix)

In other words, the relativistic Doppler effect does not support or confirm Special

Relativity theory, as Einstein and others have claimed. Rather, the acceptance of the rest

of the Special Theory of Relativity supports the relativistic Doppler effect. This mutual

and circular bootstrapping of 'proofs' and 'acceptance' (the acceptance of one dubious

theory supports another dubious theory) is not very convincing.

       The only so-called 'confirmation' that classical Doppler shifts change in the way

that the Lorentz transformation asserts they do, is Einstein's Special Relativity theory

itself. (Einstein, 1905d [Dover, 1952, pp. 55 – 56]) Thus, contrary to Einstein's

assertion, his relativistic Doppler formula is <u>not</u> "found to be in accord with

experience."[11] (Einstein, *Relativity*, p. 55) Logically, the unobserved relativistic Doppler

effect cannot be confirmation or proof of the theory which created it…Special Relativity.

C. The Relativistic Transverse Doppler Effect

       Einstein's and his followers also claimed that his relativistic Doppler formula

"predicts a *transverse Doppler effect*, an effect that is *purely relativistic*, for there is no

transverse Doppler effect in classical physics at all." [12] (Resnick, 1968, p. 90) There is

no observed transverse Doppler effect of light for the same reasons that there is no

acoustical Doppler effect. The frequency of receipt of the sound waves and the light

wavefronts remains constant for the observer who is located <u>perpendicular</u> to the motion.

Empirically, if the relative motion of the sound source or the light source is transverse to

the position of the observer (they are relatively at rest), then no spectral shift is perceived

by either the listener or the observer.

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[11] In fact, the only experience which the relativistic Doppler effect was in any way in accord with, was the
empirical and classical Doppler effect of light.

[12] The rationale for this prediction seems to be that only <u>relative motion</u> is necessary for the effect.

However, according to the relativists, the only thing necessary to change the frequency of light wavefronts from the source as viewed by the observer is <u>relative motion</u>. Therefore, according to the relativists, transverse relative motion should also produce an <u>immediate</u> frequency change as received by the observer. "If our line of sight is 90° to the relative motion, then we should observe a frequency v which is *lower* than the proper frequency v' of the source which is sweeping by us."[13] (Resnick, 1968, p. 90) In other words, theoretically we should observe a red shift.[14]

Resnick goes on to assert that the: "transverse Doppler effect has a simple time-dilation interpretation." (Resnick, 1968, p. 90)

> "The moving source is really a moving clock beating out electromagnetic oscillations. We have seen that moving clocks appear to run slow. Hence we see a given number of oscillations in a time that is longer than the proper time…Therefore, we observe a lower frequency than the proper frequency. The transverse Doppler effect is another physical example <u>confirming</u> the relativistic time dilation." (*Id.*, pp. 90 – 91)

Let us scrutinize these claims by Resnick. Einstein attempted to convince us that his concept of the Relativity of Simultaneity (time dilation) had merit, but he failed. (Chapter 18) So we have <u>not</u> seen that moving clocks appear to run slow. This invalid time dilation concept is then used by Resnick to rationalize the existence of a transverse Doppler effect, which in turn is claimed to confirm the concept of time dilation. Does this circular reasoning convince any readers?

Many other relativists echo Resnick's conclusions.[15] (i.e., Bergmann, pp. 133 – 134; Born, pp. 301 – 302; Bohm, pp. 71 – 80) French asserts that the linear relativistic

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[13] The only rationale for this conclusion is the application of the Lorentz transformation to such frequency v.

[14] The fact that empirically no red shift is observed by telescopic spectrometers is direct experimental evidence that the transverse Doppler effect does not exist.

[15] Bergmann points out that: "this relativistic law differs from the classical law only by the denominator $[\sqrt{1 - v^2/c^2}]$." (Bergmann, p. 133)

Doppler effect is of the first order, v/*c*. Whereas, the relativistic transverse Doppler effect is of the second order, a much smaller effect. (French, p. 144)

> "If one is to establish the existence of this transverse, or second-order, Doppler effect…one must be sure that the angle θ is precisely π/2 [90°]. A deviation…would cause the first-order Doppler factor…to swamp the effect being sought." (*Id*.)

The 1938 canal ray experiment of Ives and Stillwell (and repetitions thereof) have been interpreted by the relativists to be the major confirmations of Einstein's relativistic Doppler formula as well as the existence of his transverse Doppler effect. (see French, pp. 144 – 146) In this experiment, radiation (canal rays) emitted from high-speed hydrogen atoms (as compared to hydrogen atoms at rest) resulted in displacements of their spectral lines which were interpreted by Ives as Doppler shifts. Significantly, such rays were not viewed from a 90° angle, but rather from an approximate 6° angle. (Zhang, p. 184) The magnitudes of the resulting shifts were similar to Ives' predictions based on Lorentz's <u>ether</u> contraction theory. Nevertheless, such results were later also interpreted by relativists "as the first testing high accuracy of [Einstein's] second order Doppler effect, produced due to time dilation."[16] (Zhang, pp. 183 – 187) Is it persuasive that the rays were observed from an angle of 6° rather than the required 90°? Is it persuasive that the same experimental result is claimed as a confirmation for both Lorentz's discredited ether contraction theory and Einstein's time dilation theory? Ives and Stillwell did not consider their experiment as a confirmation of Special Relativity. (French, p. 146; Gill, p. 137)

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[16] Such interpretation is highly suspect, because (as French points out) based on the initial measurement (before interpretations of such measurement) there was no observed transverse Doppler shift. (see French, p. 146)

Regardless of dubious experiments and their interpretations, the simple facts of reality remain. We have demonstrated in Chapter 18 that Einstein's concepts of the Relativity of Simultaneity (duration) and time dilation have no merit whatsoever.

Therefore, Einstein's prediction of a "transverse Doppler effect" is nothing but his unsubstantiated conjecture. It is certainly not experimental confirmation that Special Relativity or time dilation is valid.[17] The fact that there is no empirical spectroscopic equivalent of a relativistic transverse Doppler effect is powerful experimental evidence that empirically it does not exist.

Closely related to Einstein's relativistic Doppler concepts is another attempted confirmation of his Special Theory and its time dilation concept.

> "…the theory of relativity enables us <u>to predict the effects produced on the light reaching us from the fixed stars</u> [18]…and the effects indicated, which are <u>due to the relative motion of the earth with reference to those fixed stars</u>, are found to be in accord with experience." (Einstein, *Relativity*, p. 55)

Here Einstein was not only talking about the Doppler effect of light, but an effect called the 'aberration of starlight' as well. [19] (*Id.*; see Chapter 6)

D. Aberration

With regard to aberration, Einstein conjectured that the classical angle of aberration was just an approximation to the first-order of magnitude (see Figure 6.1), and that the Lorentz transformation (with $\sqrt{1 - v^2/c^2}$ as the denominator) describes the angle of aberration <u>more precisely</u> to the second-order of magnitude. (Resnick, 1968, pp. 85-87; Einstein, 1905d [Dover, 1952, pp. 56 – 57])

This assertion, of course, assumes that the *ad hoc* Lorentz transformation

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[17] Given enough imagination, the Lorentz transformation can probably "predict" all sorts of other bizarre phenomena. Given enough time, so can horoscopes and the multitude of imaginative predictions by Nostradamus. But unconfirmed predictions and unobserved phenomena are not proof of the validity of Special Relativity nor of the Lorentz transformation.

[18] Of course the stars are <u>not</u> fixed, but rather they orbit the core of the Milky Way Galaxy at about 100 – 300 km/s and also travel through cosmic space along with the Milky Way Galaxy at an indeterminable velocity. In reality, many of the stars which we see are actually distant and separate galaxies. (Hubble, 1929) But most of these facts were not known to Einstein in 1916 when he wrote *Relativity*.

[19] "We refer to the yearly movement of the apparent position of the fixed stars resulting from the motion of the earth around the sun (aberration)…" (Einstein, *Relativity*, p. 55)

equations and the Special Theory of Relativity are empirically correct, and that Einstein's calculations are more precise than the classical calculations. However, there is no experimental or observational proof that either calculation (classical or relativistic) is more precise than the other. As Einstein himself acknowledged, Special Relativity and its Lorentz transformations, *a priori*,

> "affects only the laws for rapid motions, in which the velocities of matter v are <u>not</u> very small as compared with the velocity of light. We have experiences of such rapid motions only in the case of electrons and ions; for <u>other motions</u> [vis. the aberration angle and the resulting miniscule tilting motion of a telescope] <u>the variations from the laws of classical mechanics are too small to make themselves evident in practice</u>." (Einstein, *Relativity*, pp. 49, 50)

Therefore, "the relativistic theory of aberration…leads to the same formula as the older theory [of Bradley in 1728] provided that the velocities involved are much smaller than that of light…[T]here is <u>no observable change</u> in any angular position in relativity theory." (E.B., 1972, Vol. 1, p. 36; Zhang, p. 153) "The resulting annual change in the star's apparent position in the sky is of exactly the same character, and for practical purposes of the same amount, as is given by the classical explanation discovered by Bradley." (E. B., 1972, Vol. 1, p. 36) "The essential difference from the older theory [is] that only relative motions between observers is involved." (E.B., 1972, Vol. 1, p. 36) In other words, the mythical concept of ether is eliminated, and along with it the 19th century idea that the ether must be stationary for aberration to occur. For these reasons, Einstein's claim that his Special Theory is confirmed by his theoretically slightly different relativistic angle of aberration remains just his theoretical conjecture. The only experience which the relativistic angle of aberration could in any way be 'in accord with' is Bradley's 1728 experiment.

<center>**E. The Clock Paradox**</center>

In section 4 of his 1905 Special Theory, Einstein described a "peculiar

consequence" of his Lorentz Transformation:

> "From this there ensues the following peculiar consequence. If at the points A
> and B of K there are stationary clocks which, viewed in the stationary system, are
> synchronous; and if the clock at A is moved with the velocity *v* along the line AB
> to B, then on its arrival at B the two clocks no longer synchronize, but the clock
> moved from A to B lags behind the other…" (Einstein, 1905D [Dover, 1952, p.
> 49])

This has been called the Clock Paradox.[20]

If one assumes (as Einstein did) that a relatively moving clock, "as a consequence

of its motion…<u>goes more slowly</u> than when at rest" (Einstein, *Relativity*, p. 42), then

there is no paradox. Mathematically, when the Lorentz transformation for the duration of

time is applied to clock A, then *a priori* an expansion of the time interval between its

ticks is what happens. (*Id*.) But logically, when one scrutinizes Einstein's concept of the

Relativity of Simultaneity (duration), this expansion of the time interval or time dilation

does not happen. It is only a verbal illusion. (see Chapter 18A) And it must be

remembered that Einstein's concept of the Relativity of Duration was the only

justification or rationale for his adoption of the mathematical Lorentz transformation.

Nevertheless, Einstein's mathematical clock paradox and his concept that

'moving clocks run slow' have been claimed by many relativists to be confirmations of

his Special Theory and 'time dilation.' (see Zhang, pp. 175 – 180) In furtherance of

these claims, efforts have been made to separate two synchronized atomic clocks on

Earth, Clock A and Clock B, and to carry clock A on an airplane around the Earth and

return it to its twin Clock B, in order to see if its greater motion has caused it to run slow.

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[20] This is also referred to as the 'twin paradox,' where twin A leaves Earth for years on a rapidly moving
rocket and theoretically returns to Earth much younger than twin B.

(Zhang, pp. 180 – 183) For example, it is claimed than an atomic clock carried around the Earth in an airplane at 900 km/h (0.25 km/s) will have lost time upon its return to Earth. But since such clock is already orbiting the Sun at 30 km/s, and is already orbiting the galactic core at 225 km/s (1,000 times faster than the airplane) *a priori* it must have already slowed down at least 1,000 times compared to its time at absolute rest. Thus, at absolute rest the atomic clock should be running much faster, but absolute rest does not exist. Does any of this mean anything?

Clock A, which is flown around the Earth, may or may not remain synchronous with Clock B, which remains on Earth, for a myriad of reasons.[21] However, time dilation is not one of them. Furthermore, in Chapter 18A we demonstrated that Einstein's concept of 'time dilation' is a myth.

Another claimed confirmation for Special Relativity involves the slower than normal decay rate of pions and muons moving from outer space toward the Earth's surface at high velocity, and the claimed reason is 'time dilation.'[22] (Resnick, 1968, p. 37; Resnick, 1992, pp. 467 – 468) By now, we know even before discussing this claim that it is invalid, because in Chapter 18A we demonstrated that Einstein's theory of the Relativity of Duration (time dilation) is invalid on its face.

F. Muons

In 1936, a new subatomic particle was discovered in cosmic rays coming from outer space. It had a magnitude of mass between an electron and a proton, and so it was

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[21] For example: different forces, gravitational pulls, centrifugal, tidal forces; different motions, a bumpy flight, seismic or other terrestrial disturbances; different velocities through space, accelerations and decelerations; different altitudes, pressures, temperatures; different construction or composition; etc., or a combination of the above.

[22] The Mössbauer effect, which asserts that gamma rays (high energy photons) in radioactive nuclei (clocks) decay at a slower rate the faster they are accelerated, is similar.

dubbed a 'π meson' (short for 'middle' in Greek). When atomic nuclei coming from

outer space at high velocities collide with nitrogen and oxygen atoms in the Earth's upper

atmosphere they produce a vast debris of π mesons (now called 'pions'). Pions are highly

unstable and almost instantly decay into a different particle called a 'muon,' which

behaves like a heavy electron. (Close, pp. 57, 69, 71)

"The majority of cosmic ray muons decay during their rapid flight through the

atmosphere, but the most energetic of them survive long enough to penetrate deep

underground." (*Id*., p. 69) On the other hand, muons artificially produced in the

laboratory on Earth have a much shorter lifespan of 2.2 microseconds when they are 'at

rest,' and then they decay into another particle called a 'positron.' (*Id*.)

This difference in the lifespan of a muon has been described as a paradox, which

has been explained according to Special Relativity as a dilation of time for the much

faster moving cosmic muons when viewed by the observer at rest on Earth. (Born, pp.

160 – 161; Close, p. 69) As rationalized by Born:

> "thus the mesons [muons] illustrate the clock paradox; each meson [muon] carries
> its own clock which determines the proper time T_0 of decay. But the lifetime T
> observed by a terrestrial observer is much larger…the moving meson [muon]
> 'sees' the distances on earth contracted and is able to pass through considerable
> distances depending upon its velocity." (Born, pp. 260 – 261)

Born's fanciful explanation for why some muons paradoxically "have" much longer lives

and make it to the surface of the Earth (and below) before decaying is not really helpful.

It borders on science fiction. Particles do not carry clocks, they do not "see" contracted

distances on Earth, and time for the Earth observers is not dilated.

Similarly, Resnick states that pions created at rest in the laboratory have an

average lifetime of only 26.0 nanoseconds. Whereas, in a certain high-energy particle

accelerator experiment, pions created at 0.913c were interpreted to live for 63.7 ns. He

concludes: "This effect, called *time dilation*, suggests that something about the <u>relative</u>

<u>motion</u> between the pion and the laboratory has stretched the measured time interval by a

factor of about 2.5." (Resnick, 1992, p. 467)

Resnick then asserts that the observer in the laboratory measures the distance

traveled by the pion in the particle accelerator to be 17.4 meters.

> "Now consider the situation according to a different observer who is traveling
> along with the pion at a speed of $u = 0.913c$. This observer, to whom the pion
> appears to be at rest, measures its lifetime to be 26.0 ns, characteristic of pions at
> rest. To this observer, the distance [traveled by] the pion is…7.1 m. Thus two
> observers who are in relative motion measure different values for the same length
> interval." (*Id.*, p. 468)

This scenario attempts to demonstrate and confirm Einstein's reciprocal concept of the

Relativity of Length.

Resnick's explanation for why rapidly moving pions live longer and travel farther

also borders on science fiction. Observers do not travel along with pions, they do not

assume the pion to be at rest, and they do not measure time and distance with clocks and

meter rods. The conjecture that these 'paradoxes' are caused by such relative motion is

not supported by any physical explanation of the processes involved.

The real reasons must involve basic natural physical processes. For example:

"Particles, like people, do not die [decay] all at the same age." (Rohrlich, p. 210) The

half-life for muons is 2 microseconds (2 millionths of one second). This means that one

half of all muons only exist this long. But the other half exist for varying periods,

including twice as long, 4 times as long, 8 times as long, 16 times as long, etc., and thus

they travel much farther than the average. Unlike humans, where few people live much

longer than the average life expectancy of 75, "for particles the range of ages is much

longer and cannot be specified in quite the same way." (*Id.*) A few muons even exist

long enough to contact the surface of the earth and below. This is not a miracle, nor a

result of Special Relativity or of time dilation. It is merely the result of a natural physical

process.

Other phenomena which may contribute to slowing down the decay rate of

particles might include: the energy which is applied to particles in an accelerator, the

kinetic energy of particles rapidly approaching the Earth, variations in temperature, the

varying effects of gravity, variations in the density of the medium, the effects of

acceleration and deceleration, the effects of magnetic fields, and the like. More than

likely, relative velocity (at a distance) has absolutely nothing to do with decay rate.

Regardless of the physical cause, it does not advance science to demand an immediate

answer (no matter how far fetched) for every unexplained paradox, nor to interpret

scientific metaphors literally.

G. Other so-called Confirmations for Time Dilation

There are other claimed experimental confirmations for time dilation. For

example, Einstein's moving light clock has been cited as a confirmation for Time

Dilation. (see Appendix A) So have the Michelson & Morley experiments, the 1851

Fizeau experiment, and many other so-called confirmations for Special Relativity. But

we neither have the time nor the desire to address and falsify each of them, one by one.

Most are basically duplications of the claims which we have discussed in this chapter, or

very similar thereto. At some point, we must simply refer to Einstein's fundamental

assertions of the Relativity of Duration (time dilation) and our fundamental

demonstrations that all of such concepts lack any merit whatsoever.

It becomes obvious that the relativists have attempted to overwhelm the skeptics and detractors of Special Relativity with the sheer volume of their claims and interpretations of experiments. For example, they cite at least 12 repetitions of the Michelson and Morley experiments between 1902 and 1930, and interpret each as an experimental confirmation of the Special Theory. (Schleif, sec. II) They cite two repetitions of the Fizeau Experiment in addition to the Hoek experiment, and interpret each as a confirmation. (*Id*., sec. III) They cite repetitions of the Thornton-Noble experiment and the Kennedy-Thorndike experiment as confirmations. (*Id*., sec. IV and VI) They cite 12 experiments between 1906 and 1964 concerning the equivalence of mass and energy as confirmations, even though this concept has nothing to do with the Lorentz transformation and Einstein did not discover it. (*Id*., sec X; see Chapter ___) They cite over 20 experiments which they interpret to be confirmations of time dilation, the transverse Doppler effect and the Twin Paradox, even though Einstein's concept of time dilation has been demonstrated to be empirically invalid, and the latter two concepts are merely theoretical examples of time dilation. (Schlief, sec. XII and XIII) Many of the claimed confirmations of Special Relativity are actually contradictions of Einstein's Special Theory, such as the Kennedy-Thorndike experiment, the M & M experiment, the 1851 Fizeau experiment, the increase in electromagnetic mass with velocity experiments, and the failure to spectroscopically observe a transverse Doppler effect. What the relativists have failed to achieve with quality (empirical confirmation), they have attempted to achieve with quantity (strained, redundant, invalid, and unconvincing interpretations).