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Theory of Virtual Reality

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Abstract: *This manuscript expresses that Newtonian picture about time and Einstein proposal about time dilation effect are both correct and completely compatible. It shows that Newtonian or Galilean velocity addition rule is not necessary to be wrong in order to justify time dilation effect. And it provides some rules based on velocity on which the degree with which time ticks for others is governed.*
Keywords: *Relativity; Time Dilation; Speed of Light; SpaceTime; Reference frame*

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I. Introduction

Special theory of relativity is a marvelous understanding proposed by Albert Einstein. It shows the connection between space and time and the causality for time dilation. It expresses why the speed of light is essential to any observer to understand time. Here this paper tries to impose that Newtonian notion of time and Einstein's notion about time are absolutely compatible and hold the same meaning to different observers differently due to relative observation.

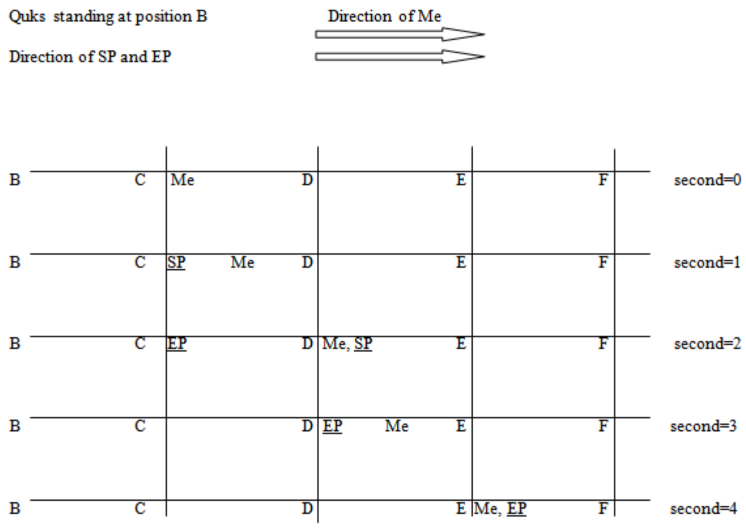
II. Explanation

Consider that my two friends Quks (standing at position B) and Ron (standing at position S) are standing keeping certain distance (d). I must say here, if Ron takes 1 second to turn around, Quks will obviously see the start of turning and the end of turning later because light will take (d/c) time to reach Quks's eyes for every single moment of the turn but she will see that Ron exactly takes 1 second duration to turn around. **So distance breaks simultaneity just how we see the past state of stars by looking at them and distance does not break the duration or the degree with which clock ticks for other. But velocity is able to break the duration or the degree with which clock ticks for others**.

Consider that I am going to meet Ron with (v) velocity after meeting Quks.

Case 1: If I look at Quks and Quks turns around

I'll see that she is turning slowly because the photon that's coming toward me after reflecting her, will take more time to reach my eyes. So, to me it will be a slow arrival of information of state of Quks of position B. I will experience less frequency of light rays. It means, if I move with c velocity toward Ron, the light that's coming toward me after reflecting Quks will take infinite time to reach my eyes. And I will never know that Quks turned around. But the problem is that the photon that's going toward Quks after reflecting me will not take infinite time to reach Quks's eyes because Quks is standing at a fix position B. If I move with (0.75c) velocity and Quks takes 1 second to turn around I'll see that she is taking 4 seconds to turn around.



Consider that BC = CD = DE = EF = 1 light second or the distance light covers in 1 second. SP(start photon) is the photon that carries the information that Quks started turning and EP(end photon) is the photon that carries the information that Quks completed her turn.

If I start moving with (0.5c) velocity from B and Quks starts turning as soon as I reach at C and if she takes 1 second to complete her turn. So she completes her turn as soon as I reach exactly in the middle of CD. But I will see that Quks starts turning when I reach at D because the SP will meet my eyes after covering BD distance after she starts turning. And the photon that carries the information that Quks completed her turn will reach at C exactly when I reach at D. EP will reach my eyes exactly when I reach at E. And I will take 2 seconds to cover the distance DE because I'm moving with (0.5c) velocity. Therefore, I'll see that Quks takes 2 seconds to turn around. But Quks actually takes 1 second to turn around. So, simultaneity and the degree with which time ticks for Quks to me both break here.

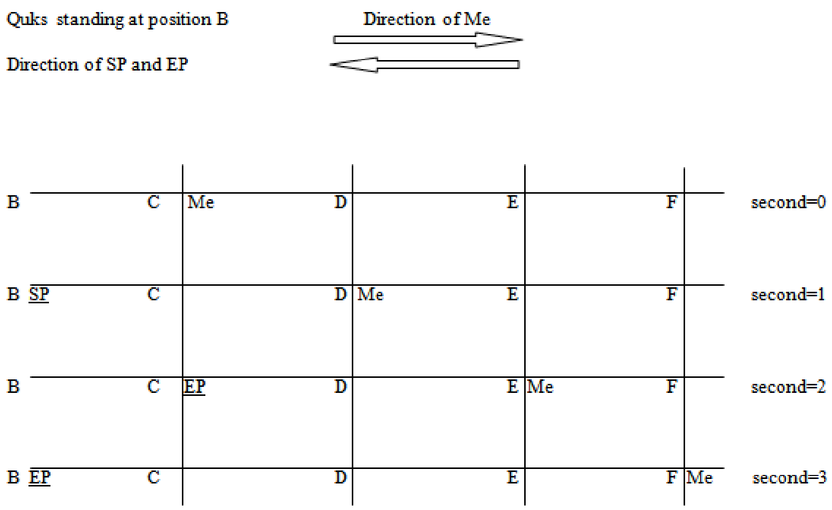
The above scenario can be expressed by,

$$T' = T \times \{c/(c-v)\} \quad (1)$$

[where T is the time I'll experience about me and T' is the time I will experience about Quks]

Case 2: If Quks looks at Me and I turn around

Quks will see that I'm turning slowly because the photon that's going toward Quks after reflecting me, will take more time to reach Quks's eyes. So, to Quks it will be a slow arrival of information of state of Me. She will experience less frequency of light rays. It means, if I move with (c) velocity toward Ron and if I take 1 second to turn around, Quks will see that I am actually taking 2 seconds to turn around.



Consider that BC = CD = DE = EF = 1 light second or the distance light covers in 1 second. SP is the photon that carries the information that I started turning and EP is the photon that carries the information that I completed my turn.

If I move with (c) velocity from B and I start turning as soon as I reach at C and I take 1 second to complete my turn. So, I complete my turn as soon as I reach at D. But Quks will see that I start turning when I reach at D because the light will meet Quks's eyes after covering BC distance after I start turning. And the photon that carries the information that I completed my turn will reach at C exactly when I reach at E. The photon that carries the information that I completed my turn will reach Quks's eyes exactly when I reach at F. And I will take 2 seconds to cover the distance DF because I'm moving with (c) velocity. Therefore, Quks will see that I take 2 seconds to turn around. But I actually take 1 second to turn around. So, simultaneity and the degree with which time ticks for Me to Quks both break here. And Quks will see me moving with (c/2) velocity or taking 2 seconds to cover CD distance.

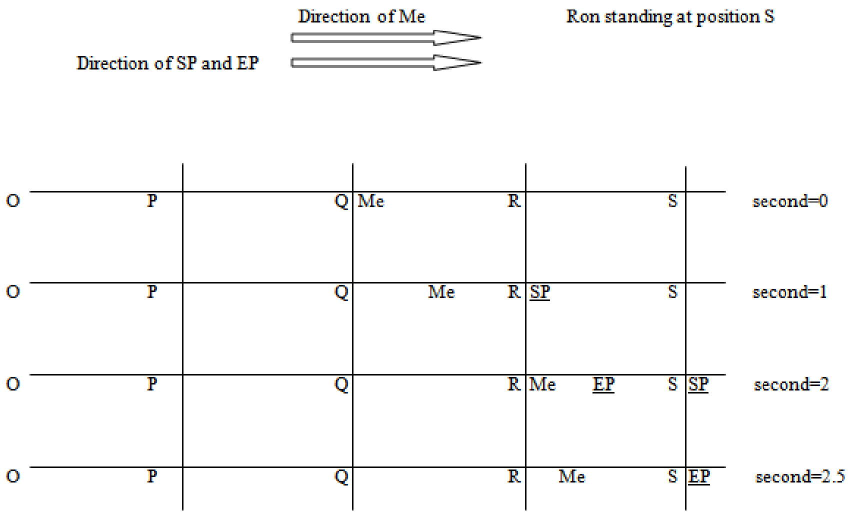
The above scenario can be expressed by,

$$T' = T\times\{(c+v)/c\} \qquad (2)$$

[where T is the time Quks will experience about her and T' is the time Quks will experience about Me]

Case 3: If Ron looks at Me and I turn around

Ron will see that I'm turning quickly because the photons that are going toward Ron after reflecting me, will cover less distances over time to reach his eyes. So, to Ron it will be a quick arrival of information of state of Me. He will experience higher frequency of light rays. It means, if I move with half speed of light toward Ron and I take 1 second to turn around, Ron will see that I am actually taking half second to turn around. If I move with (c) velocity toward Ron, he will never know that I am coming toward him unless or until I reach to him.



Consider that OP = PQ = QR = RS = 1 light second or the distance light covers in 1 second. SP is the photon that carries the information that I started turning and EP is the photon that carries the information that I completed my turn.

If I move with (0.5c) velocity from O and I start turning as soon as I reach at Q and I take 1 second to complete my turn. So, I complete my turn as soon as I reach in the middle of QR. But Ron will see that I start turning when I reach at R because the light will meet Ron's eyes after covering QS distance after I start turning. And the photon that carries the information that I completed my turn will reach in the middle of RS exactly when I reach at R. The photon that carries the information that I completed my turn will reach Ron's eyes exactly when I reach ¼ of RS. Therefore, Ron will see that I take 0.5 second to turn around. But I actually take 1 second to turn around. So, simultaneity and the degree with which time ticks for Me to Ron both break here.

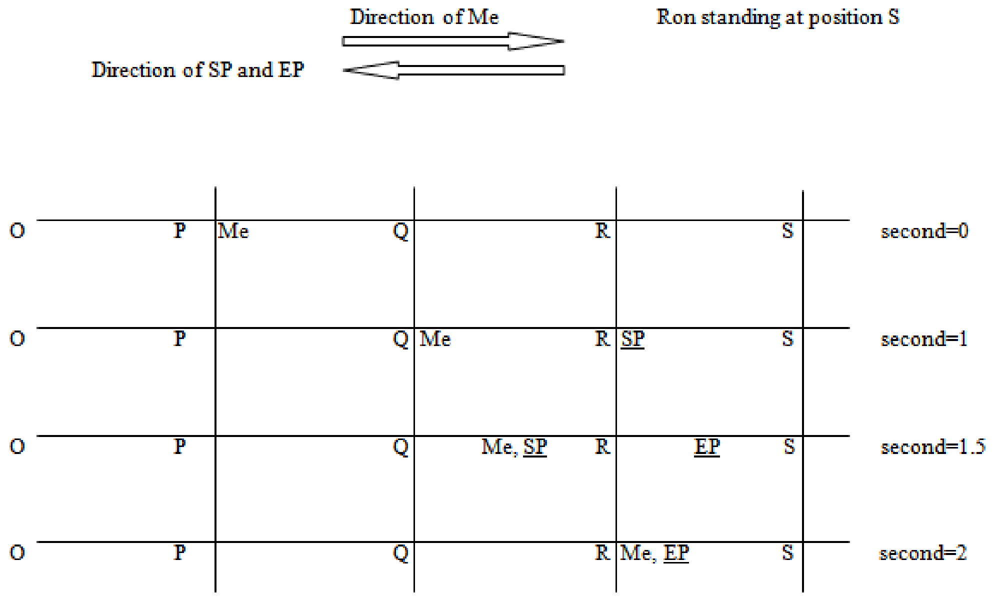
The above scenario can be expressed by,

$$T' = T\times\{(c-v)/c\} \qquad (3)$$

[where T is the time Ron will experience about him and T' is the time Ron will experience about Me]

Case 4: If I look at Ron and Ron turns around

I'll see that he is turning quickly because the photons that are coming toward me after reflecting him, will cover less distances over time to reach my eyes. So, to me it will be a fast arrival of information of state of Ron of position S. I will experience higher frequency of light rays. It means, if I move with (c) velocity toward Ron and Ron takes 1 second to turn around, I will see that Ron is actually taking half second to turn around.



Consider that OP = PQ = QR = RS = 1 light second or the distance light covers in 1 second. SP is the photon that carries the information that Ron started turning and EP is the photon that carries the information that Ron completed his turn.

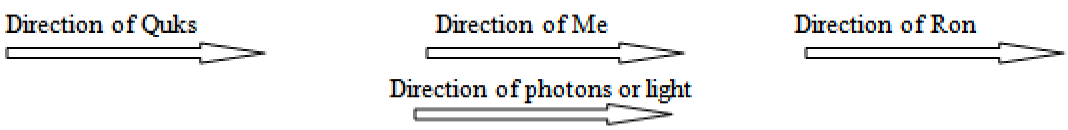
If I move with (c) velocity from O and Ron starts turning as soon as I reach at P and he takes 1 second to complete his turn. So he completes his turn as soon as I reach at Q. But I will see that Ron starts turning when I reach in the middle of QR. And the photon that carries the information that Ron completed his turn will reach in the middle of RS exactly when I reach in the middle of QR. The photon that carries the information that Ron completed his turn will reach my eyes exactly when I reach at R. Therefore, I'll see that Ron takes 0.5 second to turn around. But Ron actually takes 1 second to turn around. So, simultaneity and the degree with which time ticks for Ron to me both break here.

The above scenario can be expressed by,

$$T' = T\times\{c/(c+v)\} \tag{4}$$

[where T is the time I'll experience about me and T' is the time I will experience about Ron]

Case 5: If Quks moves toward me with (u) velocity and I move toward Ron with (v) velocity and if I look at Quks Or, If I move toward Ron with (u) velocity and Ron moves with (v) velocity in the same direction and if Ron looks at Me.



The above scenario can be expressed by,

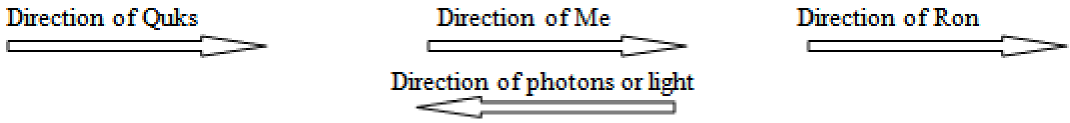
$$T' = T\times\{(c-u)/(c-v)\} \tag{5}$$

[where T is the time I'll experience about me and T' is the time I will experience about Quks]

Or

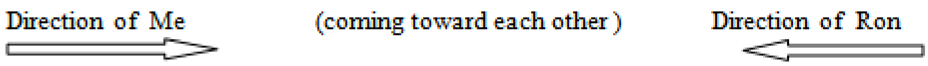
[where T is the time Ron will experience about him and T' is the time Ron will experience about Me]

Case 6: If Quks moves toward me with (u) velocity and I move toward Ron with (v) velocity and if Quks looks at Me Or, If I move toward Ron with (u) velocity and Ron moves with (v) velocity in the same direction and if I look at Ron.



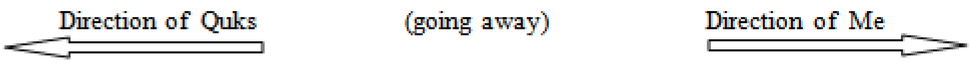
The above scenario can be expressed by,
$T' = T \times \{(c+v)/(c+u)\}$ (6)
[where T is the time Quks will experience about her and T' is the time Quks will experience about Me]
Or
[where T is the time I'll experience about me and T' is the time I will experience about Ron]

Case 7: If I move toward Ron with (v) velocity and Ron moves toward me with (u) velocity and if I look at Ron Or, if Ron looks at Me.



The above scenario can be expressed by,
$T' = T \times \{(c-u)/(c+v)\}$ (7)
[where T is the time I'll experience about me and T' is the time I will experience about Ron]
$T' = T \times \{(c-v)/(c+u)\}$ (8)
[where T is the time Ron will experience about him and T' is the time Ron will experience about Me]

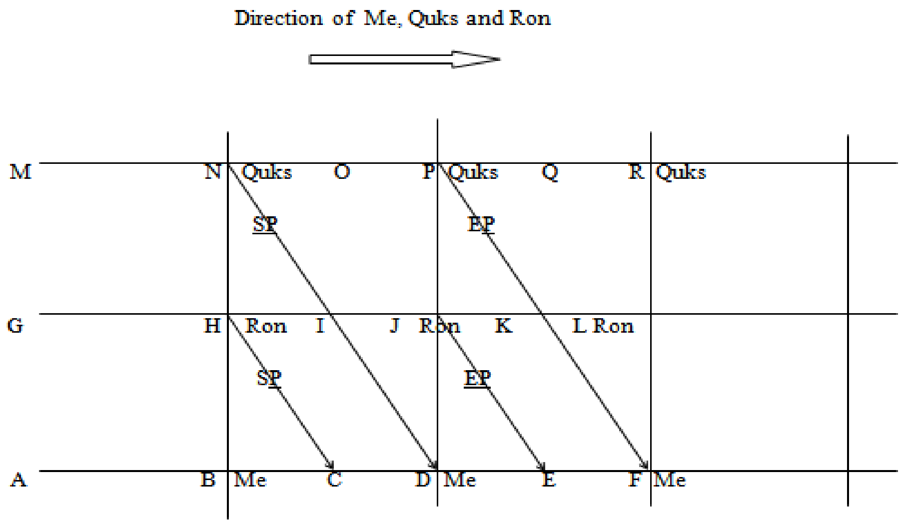
Case 8: If I move toward Ron with (v) velocity and Quks moves with (u) velocity in the opposite direction and if I look at Quks Or, if Quks looks at Me.



The above scenario can be expressed by,
$T' = T \times \{(c+u)/(c-v)\}$ (9)
[where T is the time I'll experience about me and T' is the time I will experience about Quks]
$T' = T \times \{(c+v)/(c-u)\}$ (10)
[where T is the time Quks will experience about her and T' is the time Quks will experience about Me]

Now, consider the below situation where Me, Quks and Ron are moving in a parallel way. And the distance between me and Ron is x1 and the distance between me and Quks is x2.

If I move with (v) velocity and Quks and Ron also move with (v) velocity and I look at both Quks and Ron.



Me, Ron and Quks are moving parallel with the same velocity and Ron and Quks both start turning as soon as they are crossing the point H and N respectively and think that they take 1 second to turn around and they cover HJ and NP distances respectively in 1 second. I will be able to see that Ron starts turning as soon as I cross the point C and I'll be able to see Quks starts turning as soon as I cross the point D. Similarly I'll see that Ron completes his turn exactly when I cross the point E and I'll see that Quks completes her turn exactly when I'll cross the point F. I will take exactly 1 second to cover the distance CE and DF because NP,HJ,CE and DF denote the same distance so I'll see that Ron and Quks both will take 1 second to turn around even though I won't see them starting and completing turning at the same moment.

Think, BH=x1 , BC=vt1 , HC=ct1 , BN=x2 , BD=vt2 , ND=ct2

$\sin\theta = BC/HC = vt1/ct1 = v/c = vt2/ct2 = BD/ND$

$\cos\theta = BH/HC = x1/ct1 = x2/ct2 = BN/ND$

$\therefore \quad (v/c)^2 + (x1/ct1)^2 = \sin^2\theta + \cos^2\theta$

Or, $\quad (v/c)^2 + (x1/ct1)^2 = 1 \qquad (11)$

From the equation (11) we can see that t1 must increase if the variable v or the variable x1 increases.

The above scenario can be expressed by below equation,

$T' = T\times\{\sqrt{(c^2-v^2)} / \sqrt{(c^2-u^2)}\}$ when $(u >= v)$ Or $T' = T\times\{\sqrt{(c^2 + v^2)} / \sqrt{(c^2 + u^2)}\}$ when $(u <= v) \qquad (12)$

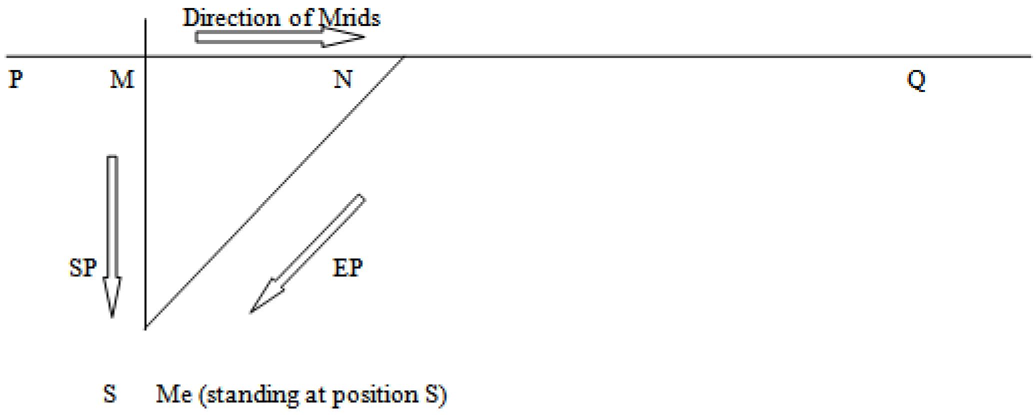
[where T is the time I will experience about me and T' is the time I will experience about Ron or Quks And u is the velocity of me and v is the velocity of Ron and Quks. For the above mentioned case u = v so T' = T that's why I'll also see them taking exactly 1 second to turn around]

Note: **To our normal observation θ is almost zero since v<<c . From the equation (11) we see t1 must increase if x1 increases and this is why it seems like a distant tree moving slower than a closer tree when we look outside from a moving train window. Secondly we also observe the movement of pebbles beside rail track being hazy and static when the train is running at high speed due to the increment of t1 because of the increment of v and we can find the relation between t1 and v from the equation (11)**

Now, consider another situation where my friends Mrids is standing at position M and I am standing at position S and the distance between us is (d). I must say here, if I take 1 second to turn around, Mrids will see it later because light will take (d/c) time to reach Mrids's eyes but he will see that I am exactly taking 1 second to turn around. So, distance breaks simultaneity because Mrids does not see me turning exactly when I am turning but distance is unable to break duration or period or interval but velocity is able to break it.

Case 9: If Mrids starts running with (v) velocity and I look at Mrids when Mrids turns around

I will see that Mrids turning slowly because the photon that's coming toward me after reflecting Mrids, will take more time to reach my eyes. So, to me it will be a slow arrival of information of state of Mrids. I will experience less frequency of light rays. It means, if Mrids move with (c) velocity and if he takes 1 second to turn around, I will see that he is actually taking √2 seconds to turn around.



Consider that SM = 1 light second or the distance light covers in 1 second. SP is the start photon that carries the information that Mrids started turning and EP is the end photon that carries the information that Mrids completed his turn.

Think that Mrids is running with (v) velocity along the PQ line and he starts turning as soon as he reaches at M. And think that he takes 1 second to complete his turn and he covers MN distance in 1 second. So he completes his turn exactly when he reaches at N. As we know that SP takes 1 second to covers MS distance so SP reaches my eyes exactly when Mrids reaches at N. So, I will see that Mrids starts turning exactly when Mrids reaches at N. Now, EP has to cover NS distance to reach my eyes in order to inform me that Mrids completed his turn. But MS<NS , therefore EP will take more than 1 second to acknowledge me.

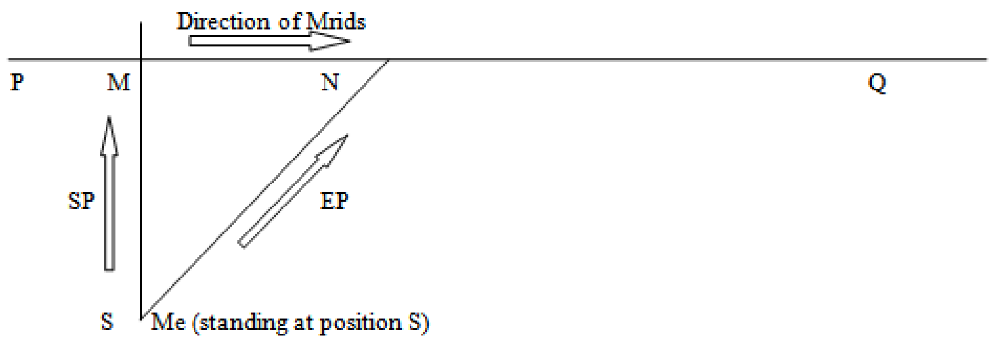
The above scenario can be expressed by,

$$T' = T \times \{\sqrt{(c^2+v^2)}/c\} \qquad (13)$$

[where T is the time I will experience about me and T' is the time I will experience about Mrids]

Case 10: If Mrids starts running with (v) velocity and Mrids looks at Me when I turn around

Mrid will see that I am turning slowly because the photon that's going toward Mrids after reflecting Me, will take more time to reach his eyes. So, to Mrids it will be a slow arrival of information of state of Me. Mrids will experience less frequency of light rays. It means, if Mrids move with (0.5c) velocity and if I take 1 second to turn around, he will see that I am actually taking 1.1547 second to turn around.



Consider that SM = 1 light second or the distance light covers in 1 second. SP is the start photon that carries the information that I started turning and EP is the end photon that carries the information that I completed my turn.

Think that SP meets Mrids eyes exactly when Mrids crossing the point M with (v) velocity. Since SP takes 1 second to cover SM distance and I take 1 second to turn around then Mrids comes to know I started turning exactly when I complete my turn and exactly when Mrids crossing the point M. Now, EP has to cover SN distance to meet Mrids eyes in order to inform him that I completed my turn and it will take more than 1 second for EP.

The above scenario can be expressed by,

$(cT')^2 = (cT)^2 + (vT')^2$ [where MS=cT, MN=vT', NS=cT']

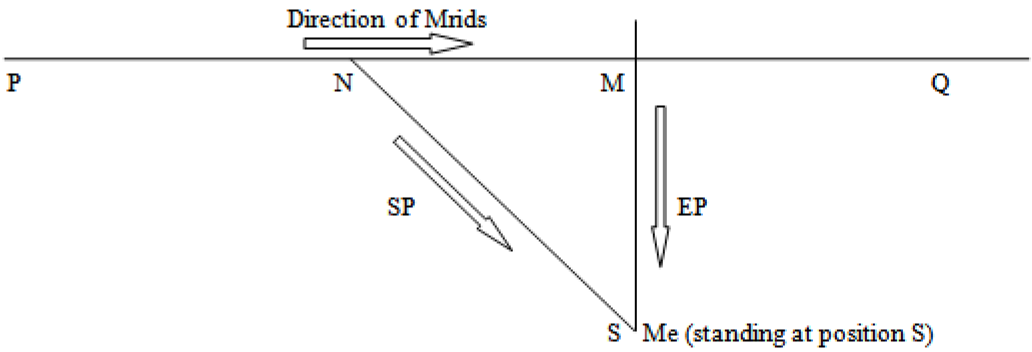
Or, $T' = T\times\{c / \sqrt{(c^2-v^2)}\}$ (14)

[where T is the time Mrids will experience about him and T' is the time Mrids will experience about Me]

Note: Special Theory of relativity uses only the above Equation (14) to explain time dilation.

Case 11: If Mrids starts running with (v) velocity and I look at Mrids when Mrids turns around

I will see that Mrids turning quickly because the photon that's coming toward me after reflecting Mrids, will take less time to reach my eyes. So, to me it will be a quick arrival of information of state of Mrids. I will experience higher frequency of light rays. It means, if Mrids move with (c) velocity and if he takes 1 second to turn around, I will see that he is actually taking 0.5857 second to turn around.



Consider that SM = 1 light second or the distance light covers in 1 second. SP is the start photon that carries the information that Mrids started turning and EP is the end photon that carries the information that Mrids completed his turn.

Think that Mrids is running with (v) velocity along the PQ line and he starts turning as soon as he reaches at N. And think that he takes 1 second to complete his turn and he covers MN distance in 1 second. So he completes his turn exactly when he reaches at M. Since we know that NS>MS hence, SP will take more than 1 second to reach my eyes. Therefore EP will already cover some portion of MS distance before SP reaches my eyes. So, EP will take less than 1 second to reach my eyes just after SP met my eyes.

The above scenario can be expressed by,

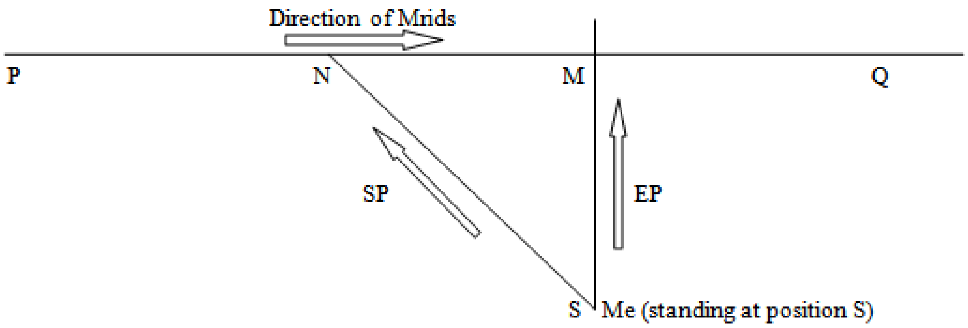
$cT' = cT - \{cT\sqrt{(1+v^2/c^2)} - cT\}$ [where MS=cT, MN=vT, NS= $cT\sqrt{(1+v^2/c^2)}$]

Or, $T' = T\times(2 - \sqrt{(1+v^2/c^2)})$ (15)

[where T is the time I will experience about me and T' is the time I will experience about Mrids]

Case 12: If Mrids starts running with (v) velocity and Mrids looks at Me when I turn around

Mrid will see that I am turning quickly because the photon that's going toward Mrids after reflecting Me, will take less time to reach his eyes. So, to Mrids it will be a quick arrival of information of state of Me. Mrids will experience higher frequency of light rays. It means, if Mrids move with (c) velocity and if I take 1 second to turn around, he will see that I am actually taking 0.75 second to turn around.



Consider that SM = 1 light second or the distance light covers in 1 second. SP is the start photon that carries the information that I started turning and EP is the end photon that carries the information that I completed my turn.

Think that I start turning and SP meets Mrids eyes exactly when Mrids crossing the point N with (v) velocity. Since we know that SN>SM hence, SP will take more than 1 second to reach to N. If I take 1 second to turn around then EP will cover some portion of SM distance when SP reaches to point N. Therefore EP will meet Mrids at point M in less than 1 second just after SP reaches Mrids eyes.

The above scenario can be expressed by,

$(2cT\text{-}cT') = \sqrt{\{(vT')^2+(cT)^2\}}$ [where MS=cT, MN=vT', NS=cT+(cT-cT')]

Or, $T' = T\times\{3c / (\sqrt{(c^2+3v^2)} + 2c)\}$ (16)

[where T is the time Mrids will experience about him and T' is the time Mrids will experience about Me]

For all the above cases, T is universal and T' is virtually real and compatible with the other equations. For all the above cases, Ron, Quks, Mrids and Me will experience different time about each other and all of us are correct relative to ourselves. And this is exactly what must be claimed. And this is exactly why Einstein's theory of relativity must be the best contribution to physics and all of science.

Equation (5), (6) and (12) explain why Galilean view and Einstein view on time are compatible. According to Galileo nobody will experience time dilation inside a ship which is moving with constant velocity. The reason is that everybody moves with the same velocity in the same direction. It means u=v for the equations (5), (6) and (12) and we also don't experience time dilation when nobody moves.

Case 6 explains what we will see if we hold a mirror in front of us and move forward with velocity (c). From "Equation (6)" we can say that we may be able to see the mirror but we shall not be able to see our faces. If the mirror is a light source instead of reflector then we will surely be able to see the light coming out from that source. This is why case 2 should be true only if I wear a light jacket otherwise Quks might not see me.

When we stand on any platform and look at any train coming toward the platform with certain constant velocity, it seems like the train is coming very slowly when the train is far away but when the train is passing by we see it crossing very fast and again when the train goes away we see it moving very slowly. We observe a virtual acceleration and deceleration. If we contemplate on the case 9 and 11 we will understand the reason behind it.

The relation between observed and emitted frequency for the above mentioned first eight cases are given below

f' = Observed Frequency, f = Emitted Frequency, λ = Wavelength

T' = Experienced Time T = Actual Universal Time

Case1:	$T' = 1/f' = \lambda/(c\text{-}v)$	where $\lambda = c/f = Tc$
Case2:	$T' = 1/f' = \lambda/c$	where $\lambda = (c+v)/f = T(c+v)$
Case3:	$T' = 1/f' = \lambda/c$	where $\lambda = (c\text{-}v)/f = T(c\text{-}v)$
Case4:	$T' = 1/f' = \lambda/(c+v)$	where $\lambda = c/f = Tc$
Case5:	$T' = 1/f' = \lambda/(c\text{-}v)$	where $\lambda = (c\text{-}u)/f = T(c\text{-}u)$
Case6:	$T' = 1/f' = \lambda/(c+u)$	where $\lambda = (c+v)/f = T(c+v)$
Case7:	$T' = 1/f' = \lambda/(c+v)$	where $\lambda = (c\text{-}u)/f = T(c\text{-}u)$
	$T' = 1/f' = \lambda/(c+u)$	where $\lambda = (c\text{-}v)/f = T(c\text{-}v)$
Case8:	$T' = 1/f' = \lambda/(c\text{-}v)$	where $\lambda = (c+u)/f = T(c+u)$
	$T' = 1/f' = \lambda/(c\text{-}u)$	where $\lambda = (c+v)/f = T(c+v)$

Comment: If a body moves with c velocity or more than that, will not be able to emit light in the direction of movement. Wavelength only depends on the velocity of source. Observed frequency also depends on the velocity of the observer.

How to prove this theory

Mathematically it has been shown that notion of time must be experienced differently due to relative motion. And it is completely independent whether we treat time as a physical quality of nature or not (i.e. special theory of relativity explains time as a physical quality of nature and thus twin brother paradox was introduced in the theory).

The velocity of sound wave is way less than light speed so, the best way to prove this theory is to check it on sound where sound medium must not move. If we continuously on and off sound maintaining certain constant interval and measure the duration of the interval by detecting or hearing for the above mentioned cases then not only the frequency will be changed due to Doppler effect but also the experienced interval time also be changed according to the equations. (i.e. in case of sound c denotes the sound speed in the equations) This is how this theory can be proved. And light will also exhibit the same nature to our observation if we on and off light bulb keeping certain constant interval instead of turning around for the above mentioned cases, then the experienced intervals will be changed accordingly.

III. Conclusion

This paper claims that time is universal and ticks at same rate but the rate at which time ticks may visually appear differently to an observer based on movement and situations. This manuscript expresses that Newtonian picture about time is correct and Einstein proposal about time dilation effect is also correct but virtually and visually since time and space are deeply connected with the occurrence of event. For the same reason length contraction for motion is a visual illusion not an actual event. Pole-Barn paradox of simultaneity in relativity is not at all a paradox because it is visually true only. Here I show that Newtonian or Galilean velocity addition rule is not necessary to be wrong in order to justify time dilation effect. And it provides some rules based on velocity on which the degree with which time ticks for others is governed. I personally believe in the presence of aether or dark energy as the medium of light but I completely avoid the existence of aether in this paper. This manuscript never claims that $E=mc^2$ relation is bound to be wrong. Theoretically, the speed of light should not be the cosmological speed limit but may be practically nothing can go faster than light. This paper does not violate the light emission theory and Maxwell equation with constant speed of light. And all the time equations mentioned in this paper do conform all the frequency equations related to Doppler effect.

Acknowledgements

There is no doubt that Albert Einstein is my admiration so it's my biggest privilege to ponder on any understanding developed by Einstein.

Conflict of Interest

I (The author) declare that I(The author) have no conflict of interest.

Reference

[1] http://physicsessays.org/browse-journal-2/product/1440-19-xinhang-shen-challenge-to-the-special-theory-of-relativity.html

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