Einstein's Derivation of the Relativity of Simultaneity is Flawed.

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Einstein's Special Relativity is more like an exercise in logic than physics. Not surprisingly, an intelligent reader might have difficulty accepting many of its deductions. His 1905 paper opens with a declaration of two postulates, the first of which more or less restates the Principle of Relativity and effectively removes the concept of absolutism provided by the elusive 'aether'. It is the second, P2, which is the main concern here. It states that light will always be found to move at exactly 'c' when measured by any observer, irrespective of the relative movement of its source. This is in direct conflict Newtonian physics and BaTh. But mere words do not constitute a sound physical law and neither the postulate nor any prediction of SR has been verified by a convincing experiment. Although SR appears mathematically consistent it does not stand up well to logical scutiny. It is shown below that it does not represent physical reality and is wrong.

What followed Einstein's introductory remarks was a very clever mathematical description of an imaginary universe in which his postulates hold good. To maintain an invariant light speed for every observer, the theory requires that lengths and time intervals are measured quantities only and are therefore frame dependent, a proposal that radically departs from the physics of Galileo and Newton. Einstein removed the philosophical aspects of time by regarding it simply as 'that which a clock measures'. He believed that intervals and instants of TIME were not universal and that 'time flow', whatever that implied, was somehow connected with light, gravitation and movement through space. The observed rate of a clock was thus affected by its speed relative to the observer, over and above normal Doppler effects. To Einstein, rod lengths and clock rates exist only through measurement.

The foundations of SR and its subsequent consistency were laid by a feature known as relativity of simultaneity (RoS), which followed Einstein's definition of clock synchronization (E-synching). Both these concepts must be fully understood if the philosophy behind SR and its relationship with LET are to be appreciated. Prior to 1905, the concept of absolute simultaneity was accepted but the question arose as to how it could be established or verified at different locations when the speed of communication between them was limited to that of light. The problem was that the light to be used was believed to move at c in the absolute aether frame and since it was deemed impossible to measure one's absolute speed wrt that frame, it would be equally impossible to ensure that two separated clocks were absolutely synchronized. Einstein seemingly solved the problem by removing any dependence on the absolute aether. He put forward the general theory that if two events were simultaneous in one frame, they would not be simultaneous in any another.

However, there is a strong suggestion that Einstein might still have been uncertain as to whether or not an absolute aether existed. This is inferred from the method he devised for synchronizing separated clocks, which is described below.

Firstly, consider the LET approach: If an aether exists and two separated clocks are moving through it at speed v, light will take time intervals L/(c+v) and L/(c-v) to travel between them in opposite directions.

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            C1_____L_____C2  ->v  wrt absolute frame.
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If the clocks are subsequently adjusted until those times are equal according to the clocks themselves, then their readings are deemed to be in synch by definition...although they are not in absolute synch unless at rest in the aether.
Einstein refined this definition by removing any reference to a single absolute frame. He argued that ANY frame could be regarded as being 'stationary', in which case, clocks that were synchronized in that frame would not be in synch in any other. This eliminated any notion of absolute synchronization (except maybe in the case of two adjacent clocks).
To demonstrate this theory, Einstein used the following thought experiment in which two rigidly separated clocks are moving at speed v in another frame defined as 'stationary' .

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Om C1_____L_____C2 ->v wrt Os frame.
S1_C__C__C__C__C__C__C__C__C__C__C__C__C__C__C__C__C__C__C__C__C__S2 Os
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Observer Os is considered stationary in this experiment and all light used throughout is deemed to move at c wrt his frame of reference. A long rod connects Os to a line of clocks that are mutually E-synched using the above method and with light moving at c in that frame. At each end is a light source that continually emits short pulses of light. Moving adjacent to Os's rod, is another pair of rigidly connected clocks, the rates and readings of which are adjusted so that whenever they pass a 'C' clock, their readings coincide. All the C clocks as well as C1 and C2 are now in synch in the stationary frame. If the stationary clocks advance by n seconds, then so do the moving ones. All the clocks are now identical in all respects, even though their readings will APPEAR to lag proportionally with observer distance.
Os correctly calculates that pulses from his two sources take time intervals L/(c+v) and L/(c-v) to travel between moving clocks C1 and C2 since the distances they will actually move are Lc/c+v) and Lc/c-v) in his frame. Os can communicate that information with Om, who should know it anyway. It is now established beyond doubt that, during the pulse transits of L, ALL the clocks advance by L/(c+v) seconds for the LH moving pulse and L/(c-v) for the RH one. These are calculated numbers that cannot be disputed.

Thus, if a LH moving pulse passes C2 at time T0, it will reach C1 when C1's reading is T0 + L/(c+v)...as will be the readings of ALL the clocks. If the actual experiment were to be performed, the recorded readings of these events MUST be found to differ by L/(c+v) as calculated. Using Einstein's own definition for light speed, outlined earlier in his paper as (light path/travel time), Om has no hesitation in concluding that the rays are moving at c+v and c-v in his frame because those speeds correspond to not only the known transit times recorded individually by BOTH his clocks but are also confirmed by the differences in readings of the two as the pulses pass.

It is here that Einstein claims an alternative interpretation consistent with his second postulate, which states that the pulses which move at c in Os's frame must also move at c in Om's frame. Therefore the pulse travel times in that frame should both be L/c and not as calculated above. Einstein then deduces that since the moving clocks do not support those figures, their readings (but not their rates) must be out of synch in their frame. The inference is that simultaneity itself is frame dependent, a principle that underlies Einstein's whole theory of Special Relativity.

The logic of the argument can be summarized thus: Om knows BY CALCULATION that the LH pulse takes time interval $L/(c+v)$ to traverse L, according to all the timepieces, including both his own. He therefore calculates that the LH ray is moving at speed $c+v$ in his frame, again according to either of his clocks. He is therefore correct in deducing that the difference in their readings when the pulse passes each one in turn should be $L/(c+v)$.... which is what MUST happen since they are in synch with the stationary clocks that do exactly that. For the RH moving pulse, the difference in their readings should be and is $L/(c-v)$. (Note, it is not possible for one clock to be running slow by $c/(c-v)$ and the other fast by $c/(c+v)$ because that would mean their rates were different...and they are not). Einstein's postulate that the pulse must move at c and not $c+v$ in the moving frame is in direct conflict with the reality that both clocks independently record that travel time as being $L/(c+v)$. His P2 is therefore impossible, presumably because it violates the very definition of a 'frame of (speed) reference'.

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A simplified version of the experiment places C2 at the centre of a rod, length 2L.

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      ____L____C1____L____->v
S__C__C__C__C__C__C__C__C__C__C__C__C__C__C__C__C__C__C__C__S
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C1's reading always coincides with those of the stationary C clocks when adjacent to one. Light pulses are emitted in opposite directions by sources at each end of the long stationary 'rod'.
Let:
e_1 = RH moving pulse reaches LH rod end.
e_2 = RH moving pulse reaches C1.
e_3 = LH moving pulse reaches RH rod end.
e_4 = LH moving pulse reaches C1.

Since those pulses move at c in the stationary frame, the stationary
observer correctly CALCULATES that their transit times from a rod end to C1
are $L/(c+v)$ and $L/(c-v)$ according to both his clocks.

For a RH moving pulse, this means that if ANY clock, moving or stationary,
reads 'x' at e_1, its reading will be $x + L/(c-v)$ at e_2. So the reading of
C1 advances by the NUMBER $L/(c-v)$ between events 1 and 2.

For a LH moving pulse, a similar calculation applies.
The reading of C1 advances by the NUMBER $L/(c+v)$ between events 3 and 4.

It is therefore an indisputable fact that C1's reading advances by different NUMBERS during the transits of the oppositely moving pulses across distance L. It therefore impossible for the speeds of those pulses relative to C1, to be identical as DEMANDED by Einstein's P2.
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Refering again to the original experiment, Einstein's logical error lies in his statement that, "Observers moving with moving rod would thus find that the two clocks were not synchronous, while observers in the stationary system would declare the clocks to be synchronous". That simply does not follow the facts.

According to him, the two clocks would be in synch IN THE MOVING FRAME only if the phasing of their READINGS was adjusted so that the oppositely moving pulses both appeared to take the SAME time, L/c, to transit L. For that condition, the DIFFERENCE in recorded clock readings as a particular pulse passes, must be the same in both directions. But such an adjustment would not be compatible with the KNOWN fact that the reading of EACH INDIVIDUAL CLOCK advances by DIFFERENT amounts during those two transits. In short, the two transit times can be represented by two pure numbers of different value. No postulate of Einstein, in all its glory, can possibly make those numbers identical.

There is no room for magic in Science. Einstein confused time 'instant' with time 'interval'. The clear implication of the above is that the speeds of the pulses in Om's frame are $c+v$ and $c-v$ and not c as his P2 demands. Clock synchronization cannot involve light emitted by a source that is NOT at rest with the clocks. Otherwise, any two clocks would have an infinite range of synchronizations at any time. The plain truth is that the above clocks labeled 'C' were all in ABSOLUTE synch and so were C1 and C2. It is obvious that if two clocks ARE in absolute synch, then pulses sent at DIFFERENT speeds in each direction WILL take different times to travel the same distance...which is what the experiment found but Einstein deliberately misinterpreted in order to support his second postulate. His elementary mistake adds more weight to the theory that light behaves entirely ballistically, a theory that has never been convincingly refuted. The clear conclusion is that the RoS is wrong and therefore so is the whole of SR.