
ESJ Manuscript Evaluation Form

This form is designed to summarize the manuscript review that you have completed and to ensure that you have considered all appropriate criteria in your review. Your review should provide a clear statement, to the authors and editors, of the modifications necessary before the paper can be published or the specific reasons for rejection.

Please respond within the appointed time so that we can give the authors timely responses and feedback.

NOTE: ESJ promotes review procedure based on scientific validity and technical quality of the paper (not perceived the impact). You are also not required to do proofreading of the paper. It could be recommend as part of the revision.

ESJ editorial office would like to express its special gratitude for your time and efforts. Our editorial team is a substantial reason that stands ESJ out from the crowd!

Date Manuscript Received: 17/5/2016	Date Manuscript Review Submitted: 19/5/2016
Manuscript Title: On the Clock Paradox	
ESJ Manuscript Number:	

Evaluation Criteria:

Please give each evaluation item a numeric rating on a 5-point scale, along with a brief explanation for each 3-less point rating.

<i>Questions</i>	<i>Rating Result</i> [Poor] 1-5 [Excellent]
1. The title is clear and it is adequate to the content of the article.	4
<i>(a brief explanation for 3-less point rating)</i>	
2. The abstract clearly presents objects, methods and results.	3
<i>(a brief explanation for 3-less point rating)</i> <i>Although it is correctly asserted that relativity of simultaneity plays a fundamental role in the clock paradox, that method is only used in the analysis of the mutual time dilation paradox. For the actual clock paradox, the Doppler analysis method according to the rest observer is used instead</i>	
3. There are few grammatical errors and spelling mistakes in this article.	4
<i>(a brief explanation for 3-less point rating)</i> <i>A few small grammatical errors and a few unusual sentence constructions</i>	

4. The study methods are explained clearly.	4
<i>(a brief explanation for 3-less point rating)</i>	
5. The conclusions or summary are accurate and supported by the content.	3
<i>(a brief explanation for 3-less point rating)</i> <i>Regretfully the author does not clearly distinguish between, on the one hand, observations by different observers according to continuously with each of them co-moving reference systems (“clock paradox”), and on the other hand, observations by different observers according to a single reference system (which is important, but it is not what the “clock paradox” is about). As a result the topic at hand is insufficiently addressed in the body of the paper.</i>	
6. The references are comprehensive and appropriate.	3
<i>(a brief explanation for 3-less point rating)</i> <i>Two IMHO wrong assertions are simply referenced by the author’s email address(!) or by “well-known”, and at least one pertinent reference is missing in which a similar method is used.</i> <i>For example Einstein 1905 for single frame calculation - http://www.fourmilab.ch/etexts/einstein/specrel/www/, and for example Builder1957 (The resolution of the clock paradox) for Doppler analyses - http://www.publish.csiro.au/?paper=PH570246</i>	

Overall Recommendation (mark an X with your recommendation) :

Accepted, no revision needed	
Accepted, minor revisions needed	
Return for major revision and resubmission	X
Reject	

Comments and Suggestions to the Author(s):

The Abstract points very nicely to the essence of the clock paradox as commonly understood (note: historically it only arose in the context of Einstein’s presentation of GR, but in the absence of historical discussion it’s not necessary to mention that). Indeed, when one keeps track of relativity of simultaneity, the SR version of the clock paradox is straightforward to solve. A detailed Doppler analysis is not strictly necessary but can be useful to enhance understanding. However, I came across several points that can be improved, and even a few important issues that require revision.

In particular:

1. “It turns out however that one could also obtain this result [SR] from the relativity principle [aabdesselam@ut.edu.sa].” However the relativity principle is part of classical mechanics too (!), your reference is insufficient, and it’s not really relevant for your topic. I would advise to simply refer to Einstein’s 1905 paper instead.
2. Equation (1): Please name at least some of the symbols, in particular time period T and length L . Moreover, ΔT seems to be inconsistent with T and therefore confusing: while T stands for time period or duration (I suppose!), your ΔT does not stand for difference in time periods but, I

suppose, for difference in readings of different clocks (coordinate times of one system) at the same time (at a single coordinate time of another system). On top of that, it may be better to leave that third equation to section 2 where you discuss it in detail; IMHO it's quite useless to introduce it at this point without explanations. Moreover it is not referenced and probably it's even wrong - see further.

3. p.2: "the two clocks are *set to work* simultaneously with respect to the observers in S' ." and "from the point of view of the observers in the frame S ".

Such inaccurate phrasing can lead to poor understanding, as all observers are in both S and S' ! Better is for example: "according to the observers of S' " and "from the point of view of observers of the frame S ". Please check for other occurrences of "observers in the frame".

4. Equations (2) and (3): as clarified here above, please consider using a different symbol than ΔT (e.g. $\Delta t'$ for $\Delta t=0$). In fact, it may be useful for the readers to specify this explicitly: "for $\Delta t=0$, $\Delta t' = \dots$ ". Also, it's not really an interval but simply a difference.

Moreover, it appears that the equations are wrong: it immediately follows from the Lorentz transformations that there should be gamma (also in (3)) and not gamma square (or 1). Indeed, the necessary symmetry between eq. (2) and (3) is lacking! Please provide a reference. Note that Builder 1957 has gamma.

5. Footnote 4: "Galileo relativity" -> "Galileo relativity with ballistic light emission"

6. Footnote 6: speed v is not a vector (the direction changes) => " $-v$ " -> " v "

7. Fig. 4: while it's not immediately clear to me where the error is (I hardly use such diagrams myself), there is probably an error in the figure: see next!

8. p.7: The moving clock EMITS the same number of pulses in both legs of the trip. However, the last of those pulses are emitted from great distance. Those pulses are received during the second leg so that the rest clock which stayed behind receives LESS pulses during the outbound leg than during the inbound leg. This is generally the case, as can easily be discerned for $v \ll c$; the Doppler effect implies that the number of pulses per time is less during the outbound than during the inbound leg. Also, "guess" -> "arrived at" (a valid calculation is not a guess) and "always in the same inertial frame" -> "always at rest in the same inertial frame".

9. p.9: "Therefore the moving observers agree with the rest ones."

As far as I can see, here you showed (or tried to show, in view of some issues) that calculations based on the "rest" system S about signals exchanged between resting objects and moving objects are self-consistent; consequently relativity of simultaneity plays no role in that analysis! However, commonly the challenge of the Clock Paradox is to show that when such calculations are done based on co-moving inertial reference systems (as if the moving observer is in rest most of the time or all the time), the same results are found. For that, relativity of simultaneity plays a crucial role, just as you claimed in the abstract -and also at least one of the listed references (Romer). Thus, either it should be shown how relativity of simultaneity plays a role in solving the clock paradox, and not only in mutual time dilation; or the abstract should be

modified to match the contents of the paper (and then some motivation should be given for not analysing the traveller's "rest" perspectives).

Note that I did not study the appendix as it doesn't seem pertinent but it may be wrong, related to the issue with drawing the Doppler effect.

Comments and Suggestions to the Editors Only:

In view of some big errors that I perceived (see above) as well as the fact that already many good papers on this topic exist, I hesitated between simple rejection and major revision. However, the author seems to be on the right track, and therefore I think that he should have the chance to improve it.

Concerning this form: The question if the body of the paper does not contain obvious serious errors, is missing. That's much more important than question 3!

