Dr. Tom Roberts Examines the Shubertian Clock

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From: Eugene Shubert (*GalileoProject002_at_everythingimportant.org*)
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Tom Roberts <tjroberts@lucent.com> wrote
http://groups.google.com/groups?&selm=A9Hed.15741$5b1.13208@newssvr17.news.prodigy.com
> Eugene Shubert wrote:
> > http://www.everythingimportant.org/relativity/special.pdf

> The quality of a derivation of the equations of SR is usually judged by:
> 1. the simplicity and physical believability of its assumptions, or
> lack thereof.

> and:
> 2. the generality of those assumptions.

I wholeheartedly agree. And by the generality of those assumptions, I assume you mean the value and added clarity that it brings to the subject and to the opening of new questions, vistas and future research. That describes my paper perfectly.

> Your derivation is seriously lacking in both of those aspects:
> 1. On page 2 your assumptions for \mu and \gamma are completely
> unsupported,

My official derivation begins on page 4. The assumption that you refer to (page 2), the principle called change of variables, also called substitution, is one of the clearest and most useful mathematical ideas in high school algebra and baby calculus. What's your dispute with intuitively simple fundamentals? What support do I need and why is it an unwarranted physical assumption if I label the function 1/sqrt(1 −v^2/c^2) with the Greek letter gamma?

> and are not obvious at all −− these are QUITE
> unusual assumptions, to say the least; why should anybody
> believe them?

Why should anyone believe in the substitution v/c = tanh(theta), which transforms the usual Lorentz transformation to its hyperbolic form? It's just the writing of one parameter in terms of another.

Why is substitution allowable here but not there? Perhaps the difference is that every child mathematician can plod through a difficult mathematical proof, checking each step for logical correctness, whereas mature physicists need their hands held by someone they trust and have their irrational prejudices pacified at every step.

> 2. Your sliding rulers work in 1 spatial dimension,

Thanks for mentioning that. You'd be surprised by the number of physicists and seemingly educated folks who have an emotional difficulty with sliding rulers!

> though you have left a lot out (e.g. how to mark them uniformly;

I suspect that just about all students of algebra at the high school level will assume that the rulers are pre−made and that even middle school students could figure out how "to mark them uniformly."

> how to know they move with uniform velocity);

They're assumed to move with uniform velocity. That translates into equal distances traveled in equal proper times. That's where the constant u comes from in the general two−ruler synchronization of the Shubertian clock:

T = T(x,x') = −x'/u + xi(x)
T' = T'(x,x') = x/u + zeta(x')

> your omissions can be corrected. But it is not at all clear how to
> apply this to an arbitrary relative velocity in 3 spatial dimensions.

My intended audience is second year algebra students in high schools and all backward uneducated folks on the newsgroups. Relativity in 3 spatial dimensions plus 1 time dimension is a college level topic.

> And you have completely left out any mention of isotropy and
> homogeneity, which are important and necessary aspects of inertial
> frames in SR.

Homogeneity and isotropy are geometric ideas of zero or virtually zero importance in 1 spatial dimension.

> This is, of course, related to the omissions I mentioned
> in #2 above; but it is not obvious how to resolve this with your
> assumptions, especially isotropy.

I encourage students to try to break the no−nonlinearity postulate of SR and construct all the Shubertian clocks possible that are unauthorized and frowned upon in conventional physics. I advise that students and researchers only do so for purely mathematical reasons

so that no sacred traditions are violated and that the sacrilege is
not to be flaunted.

http://www.everythingimportant.org/viewtopic.php?t=221
http://www.everythingimportant.org/relativity/generalized.htm

> A better approach, IMHO, is to use group theory: given sufficient
> postulates to establish isotropy and homogeneity of the coordinates,

Homogeneity and isotropy are mathematical terms that describe a geometry, not coordinates. You are perfectly free to break with standard mathematical convention and define what you mean by homogeneous and isotropic coordinates but I've never seen you do that. I've seen you presupposing that space and time together is a geometry called spacetime and that the homogeneity and isotropy of spacetime automatically implies that coordinate transformations are linear.

The problem with your approach to SR is that you don't define what a geometry is so it's impossible to really understand the implications of homogeneity and isotropy in your vague, meaningless and nebulous terms. I don't mean to discourage you from pursuing a geometric derivation. It's just that the fallacy of supposed linearity of coordinate transformations is easily refuted by simply defining geometry according to Klein's Erlanger Program:

"Every geometry is defined by a group of transformations, and the goal of every geometry is to study invariants of this group." Klein, Erlanger Program.

"Each type of geometry is the study of the invariants of a group of transformations; that is, the symmetry transformation of some chosen space." Stewart and Golubitsky 1993, p. 44.

"A geometry is defined by a group of transformations, and investigates everything that is invariant under the transformations of this given group." Weyl 1952, p. 133.

"The geometry of Minkowski space is defined by the Poincaré group."
http://en.wikipedia.org/wiki/Poincar%E9_group
Here's the critical point. It's easy for any child mathematician like myself to show that the nonlinear transformation group of exercises 1 and 2 of http://www.everythingimportant.org/relativity/generalized.htm is isomorphic to the Poincaré group. That means that their respective geometries are isomorphic, i.e., indistinguishable. Thus, it's impossible to prove linearity of coordinate transformations from homogeneity and isotropy alone. If Minkowski space is isotropic and homogeneous, then so is the geometry defined by my wildly nonlinear transformation group.

> group theory constrains the transforms to 3 groups:
> The Euclid group in 4 dimensions

> The Galileo group in 3 dimensions
> The Lorentz group in (3+1) dimensions
> The first has grossly unphysical consequences, and the second does not
> agree with basic observations about the world, such as the simple fact
> that pion beams exist. But the Lorentz group works, and is the basis of SR.
>
> Evaluated on the basis of those above criteria, this approach is VASTLY
> simpler and more general than yours.

My approach is obviously more general and informative. The Shubertian clock is the discovery I used to correctly understand and properly interpret the first counterexample to Einstein's thoroughly misguided no−nonlinearity postulate of special relativity. That's a new result.

When you remove the nonsense argument about homogeneity and isotropy implies linearity, your approach will be simple. But I use group theory also and you should notice that I begin with the greatest conceivable nonlinearity possible and then I quickly and honestly simplify the problem to linear mathematics, two unknown functions and an easily invertible matrix. What I've done is spend a lot of time explaining an intuitively simple and straightforward definition of time−−the Shubertian clock. That's to my credit.

> It was already old when I first saw it ~1972.

What you have is just a slight rewrite of the findings of Ignatowsky, Frank and Rothe in papers written between 1910 and 1912.
http://groups.google.com/groups?selm=CQ1R9.535927$%m4.152001@rwcrnsc52.ops.asp.att.net

> [I posted a version of this some 15−20 years ago, but realize
> my ancient presentation has some major flaws (which can be
> corrected).]

> Tom Roberts tjroberts@lucent.com

Eugene Shubert
http://www.everythingimportant.org/relativity/special.pdf