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Gooey Ducks and Naked Physicists

Part II
The Wild and Wonky

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Abstract: An allegory of modern science.

Eight *Part II*

I went over and sat down in front of the computer. From my window, my favorite view–low mist, the tugs, the sailboats, the sea–calming and peaceful like a Japanese watercolor.

There was an email from Eva:
"The ballet: Don Quixote, 7:30 Friday night. Tickets will be at the box office.
My sister will meet you there. Please don't be late."

Oh…back to reality. Well, a promise is a promise. Eva's always trying to inject a little culture into my life. But the ballet? I guess there's no backing out now.

It's close, anyway, over on Mercer. Passed by it a million times, but never went in before. Wonder what it will be like. Tilting at windmills…might be fun.

Hmm…back to what I was doing.

I typed in *relativity* and looked on the Wikipedia website.

There I read the basis, or "proof," of relativity was the Michelson-Morley experiment of 1887. (1887? Out west, cowboys and Indians; back east, comptometers and interferometers.)

So I looked up this experiment. Wow! I found a heading that read almost like a headline:

MOST FAMOUS "FAILED" EXPERIMENT!!

And quotes from scientists, such as Albert Michelson and Albert Einstein, all reiterated the same point: The experiment had no results!

Incredible–relativity was founded on an experiment with no results!

I guess no result is still a result…but, wow, a mountain of hoopla over nuthin'!

If I think about it, the same headline would apply to relativity's "disproof."
When the velocity of light was exceeded at CERN, there were no results either–nothing!
Amazing–the "proof" and the "disproof,"–all these experiments of relativity with no results.
This must be something unique in scientific history!

It all makes sense now. Relativity never went anywhere because there was nowhere to go.

Hmm…relativity based on nothing. Am I missing something here?

Maybe I'll take a closer look.

I went back to the explanation and diagram of the Michelson-Morley experiment.

The experiment was based on the theory that the relative motion of the earth through an aethereal substance (hypothesized as filling all space) would cause a difference to occur in the distance light traveled along two perpendicular paths through the interferometer.

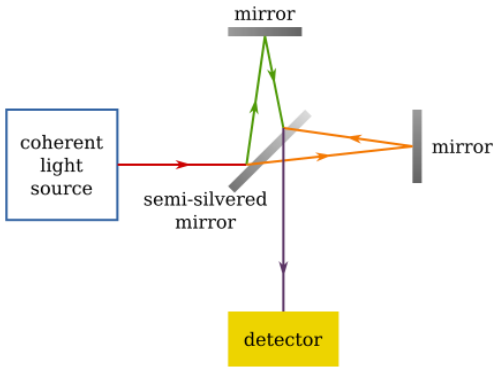

Diagram of the Michelson-Morley Interferometer Experiment

The results: there were none. Nothing happened.

So far so good; I could understand the experiment.

But then came the part I didn't understand.

Even though there were no results and no evidence to support the theory that the distances were different for the two paths the light traveled through the interferometer, equations were developed as though the light had indeed traveled two different distances!

I looked closely at one of the equations (relativity's famous equation for length contraction):

$$L = L_0\sqrt{1 - v^2/c^2}.$$

This equation contains two distances for the light's travel: a theoretical distance, L, indicated for one path, and an actual distance, L_0, indicated for the other path.

In the equation, the theorized distance, L, is being created by multiplying the actual (proper) distance L_0, by the quantity $\sqrt{1 - v^2/c^2}$.

So it's not the results of the Michelson-Morley experiment, but rather this mathematical quantity, $\sqrt{1 - v^2/c^2}$, that is the real foundation of the theory of relativity. Amazing!

This one mathematical quantity is the vehicle for the theory, its imagination, and everything that follows!

Wow! Something this important must have a name! I looked it up. It did! The Lorentz factor!

Ooh–I liked the sound of that. It could be the title of a sci-fi thriller or a Ludlum novel. Right up my alley…mystery, adventure, romance. Can't wait to dive into this!

I continued reading about the Lorentz factor and found it expressed in the reciprocal form

$$\frac{1}{\sqrt{1 - v^2/c^2}.}$$

Aha! Now I see the "light limit" that relativity is famous for.

I had always heard that the mathematics of relativity was intimidating, but this looks simple enough.

With v the velocity of the earth and c the velocity of light:

- If v were equal to *c*, the ratio of v^2/c^2 would be $1/1$.
  And subtracting this $1/1$ ratio from one, results in trying to take the square root of zero and also divide one by zero.
- If v were greater than *c*, the ratio of v^2/c^2 would be greater than 1.
  Subtracting this ratio (greater than one) from one, results in taking the square root of a negative number.

So the math seems to eliminate the possibility of any velocity greater than light, c.

But talk about the elephant in the room!
If it's not possible to exceed *c*, what's up with using c^2 in the equation?

I know this is a moot point, since the velocity of light has already been exceeded in the experiments of CERN and relativity has already been disproven, but now I can see why!

The entire theory of relativity was based on a mathematical contradiction!

Wow! Relativity disproves itself!

The mystery is solved, the culprit unmasked! It wasn't the butler who did it–it was the math all along! Shame on the math!

I could already envision another headline:

RELATIVITY DISPROVEN BY ITS OWN MATH!!

The elephant in the room

Nine

How wild and wonky is this! Math run amok! The elephant in the room got loose!
I can almost hear him trumpeting as he disappears over the horizon.

Wow! It just occurred to me. If I wanted to, I could create my own brand of relativity!
I don't need a laboratory or fancy equipment–all I need is math!
This sounds like fun. I think I'll try it!

First, I'll theorize the earth moving through an aethereal substance.
Next, I'll need another velocity. Aah, there's a tennis ball in the desk drawer. I'll use that.

I will drop the tennis ball to the floor and theorize that the ball should fall to one side–to indicate the velocity and direction of travel of the earth through the aether. (I will call the actual distance the ball drops to the floor L_0 and my theorized, imaginary distance L.)

I drop the ball, mark where the ball hits, and do it again.
There's no indication of the tennis ball falling to one side. This is good. I receive no results.

Now I have everything I need.

With the velocity of the earth, v, and that of the tennis ball, b, I can develop my own "tennis ball" Lorentz factor: $\sqrt{1 - v^2/b^2}$.

I can then multiply the actual distance the tennis ball falls to the floor, L_0, by my "tennis ball" Lorentz factor, $\sqrt{1 - v^2/b^2}$, and achieve an equation for my theorized (imaginary) distance L:

$$L = L_0\sqrt{1 - v^2/b^2}.$$

So, easy peasy lemon squeezy! All I have to do is:

1. Theorize two distances of travel (a real and an imaginary) for the tennis ball that is actually only traveling one distance.
2. Develop my own Lorentz factor.
3. Voila! I have my own "tennis ball relativity"!

This would work for any velocity! I could create an equation to show the velocity of anything–a tennis ball, light, whatever–to be a theoretical limit that nothing could exceed and that time, length, and mass would transform around. Wow!

Math and imagination–the dynamic duo. What a wild combination!

Ten

I opened the window to listen to the gulls. Another lazy afternoon.
Pizza's all gone, so now what? I looked in the cupboard. Hmm…Cocoa Krispies, Frosted Flakes, Post Toasties–no, better go with the Wheaties.

I got my milk, bowl of cereal, my buttered toast and sat back down.
My thoughts drifted back to relativity and math.

If I'd had any doubts as to the strength and potential of the language of math, I sure didn't now. Even though the mathematics of relativity contained an obvious error, its influence was astounding! It was sensational!

And people say math is boring! What excitement!
The math of relativity was the megastar of the century! Relativity was it!

The Beatles and Elvis only had thousands of teenage girls screaming and fainting in the aisles. Betty Grable, Marilyn Monroe, Sophia Loren, Kim Kardashian–those great icons of beauty, those bombshells, couldn't compete. Gracing the hallowed walls of university labs, dorms, schoolrooms, and cyber garages all around the globe, that poster boy of science–
Einstein with his $E = mc^2$–remains the pinup of choice, the pop icon of the moment.

Talk about universal appeal! It's as if the entire world was infected with Einsteinitis!

Just the word *Einstein* or *relativity* brings immediate recognition.

With so much influence comes so much responsibility. Got to do it right!
If an error was able to take us this far, imagine what can happen if we get it right.
All I can say is,"Hang on!"

So I'm back to where I left off: What went wrong?

The problem with the *theory* of relativity is easy enough to spot: theorizing two distances (an actual and an imaginary) for something only traveling one distance.

But what was the real problem with the math?
Was it just a misuse of the language, or was it something deeper–something amiss in the language of mathematics itself?

Eleven

Now relativity's mathematical contradiction seems so obvious.

To use a velocity greater than light (the velocity of light squared, c^2) in an equation to express the theory that it's not possible to have a velocity greater than light, c, it's a no-brainer!

$E = mc^2$ is its own disproof!

But I wonder why it was so hard to see this before.

Maybe if I break it down:

- Relativity wouldn't have existed without the Lorentz factor, $\sqrt{1 - v^2/c^2}$, and
- the Lorentz factor depended upon the ratio of squared velocities, v^2/c^2.

So I guess it boils down to the ratio of v^2/c^2.

Since velocity of light squared, c^2, was shown to be a mathematical contradiction (invalid) within the mathematics of relativity, does that make the ratio of v^2/c^2 invalid as well? Does the squaring of velocity make it invalid? If it does, where does that leave v^2?

Boy oh boy! This is taking me somewhere I never imagined!

Before, I wouldn't have dreamed of questioning a mathematical term.

But now I'm starting to wonder.

Hmm…velocity squared–invalid or simply theoretical?

Velocity is certainly real, but is the square of velocity real? Does velocity squared exist?

I'm starting to see all this squaring of velocities in a new way–the philosophy of velocity.

I might even be so bold (do I dare?) Yeah, I'll give it a "scientific" name,

$$v^2/c^2,$$

Scientia Disrupta, Scientificum Interuptum, or maybe Mathematicum Disruptum?

I can't decide. I guess I'll leave it to the Latin experts.

But why stop there? Why not take the bull by the horns?
If I'm brazen enough to question velocity squared, why not tackle time squared, too?

This is starting to be fun!

If velocity squared is invalid (or theoretical) and it is composed of distance squared and time squared, $$v^2 = \frac{d^2}{t^2},$$

then either distance squared or time squared must be invalid (or theoretical).

Certainly distance squared, d^2, is valid–it's just another name for area calculation.
That must mean time squared is either invalid or theoretical!

Who would've thought!
So this brings me back to relativity:

- as relativity depended on velocity squared,
- and velocity squared depends on time squared,

then relativity's entire time travel theory and equations are based on the square of time!

Now it's starting to make sense: I think I found Einstein's magic carpet!
It wasn't light, as we were led to believe, it was time all along!
Kaboom! I think I just broke the light barrier!
It wasn't a dream-beam of light relativity was riding on.
All the dreams of time travel–all the relativistic theories–were based upon a square of time!

Wow! I hadn't realized how much could rest on one mathematical concept.
Yeah, I know some wag may say, there's a "Times Square" in New York. Very funny.
But, seriously, what is a square of time?

I can't imagine what it would be. What would it look like?
Would it be bigger than a bread box, or something so small that I could put it in my pocket to carry home with me?
I get no image–nothing.

I wonder: Is there a mathematical basis for squaring time?

Hmm, time squared, square time: mathematical fact, fiction, or theory?

Twelve

The phone rang. I thought it might be one of those pesky calls. You know, the ones with a machine on the other end. But no, thank goodness it was Eva. She'd called to remind me about the date with her sister. I told her what I was doing, and she brought up the concept of space-time. What a smart cookie! Don't know what I'd do without her.

Space-time: sounds intriguing, so scientific. I wonder if it has anything to do with square-time? Couldn't resist–I had to look it up on Wikipedia.
Space-time is defined as

> *any mathematical model that combines space and time into a single interwoven continuum*.

Wow! Combining space and time? Wait a minute–this sounds vaguely familiar!
It sounds an awful lot like a description of relativity's velocity squared!

- Velocity squared is distance squared divided by time squared (area of space over time).
- A space-time continuum is a mathematical model combining space and time.

Seems pretty simple. Space-time is unmasked! It's not something unfathomable and mysterious. It's just another name for velocity squared! Distance squared divided by time squared: Wow! That's all it was! So this is what a mysterious continuum looks like:

$$v^2 = \frac{d^2}{t^2}$$

I must say, I'm a little disappointed. What a letdown!

So relativity's space-time was created the moment the attempt was made to divide distance squared by time squared (to divide area by time), and the whole relativistic era was just about trying to square time. Man, I can't even square the circle!

It boggles the mind–the gazillions of dollars, the time and effort expended on one concept! Without the square of time the entire mathematical structure of relativity crumbles to dust!

I think I'm starting to see another headline:

GENERAL RELATIVITY AND SPACE-TIME UNWARPED!

STRING THEORY UNRAVELED!

I wonder what else this affects? What's next?