Response to S. Crothers' "Exposition of the Unimodular Defect"

A brief look at the use of basic logic in the discussion of Einstein's invalid field equations and the general bunkishness of General Relativity

An EPEMC Response to the General Relativity Debacle[1]

Sf. R. Careaga, BSEE, MSTOM
Lexington, KY

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Re: Unimodular Defect of GR.

From the Desk of Sf. Ramon Careaga, founder EPEMC, www.epemcgateway.com

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Dear Readers,

Stephen Crothers has done it again. A simple, but effective paper debunking Einstein. As usual I do not expect that anyone will do a solid rebuttal. I'd like to direct you to the above link so you can read it yourself. It's quite succinct. I'm going to highlight four or five areas that got my attention, as well as explain for the general audience the *if, then, else* nature of a simple debunk. It's an old style, but effective, and wholly valid (and needed) in this post-modern world. The key part of the abstract is this sentence:

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[1] And in this way, an extension on our Dark Universe Debunking series. DUD 3.x

> *"In these coordinates, the field equations can be written explicitly in terms of the Einstein pseudotensor for the energy-momentum of the gravitational field."*

He's talking about unimodular coordinates:

> *"In geometry and mathematical group theory, a unimodular lattice is an integral lattice of determinant 1 or −1. For a lattice in n-dimensional Euclidean space, this is equivalent to requiring that the volume of any fundamental domain for the lattice be 1. The E_8 lattice and the Leech lattice are two famous examples."[2]*

Setting aside the facts of what he has said, I am not in favor of special cases being used for things that are supposed to describe Universal conditions. I think the first debunk to be had is in this very sentence. It's a special case of use of the unimodular coordinates, and I don't think that helps *General* Relativity, as a philosophical discussion of Universality. However, I'll give Einstein a pass for the moment and let Stephen set about his work.

> (1)*"Since this pseudotensor produces, by contraction, a first-order intrinsic differential invariant, (2) it violates the rules of pure mathematics. (3) This is sufficient to prove that Einstein's unimodular field equations are invalid. (4) Since the unimodular form must hold in the General Theory of Relativity, (5) it follows that the latter is also unsound, lacking a proper mathematical foundation."* (numbers added by myself)

1. *"In mathematics, a **differential invariant**[3] is an invariant[4] for the action of a Lie group on a space that involves the derivatives of graphs of functions in the space. Differential invariants are fundamental in projective differential geometry, and the curvature is often studied from this point of view.[1] **Differential invariants[5] were introduced in special cases** by Sophus Lie in the early 1880s and studied by Georges Henri Halphen at the same time. Lie (1884) was the first general work on differential invariants, and established the relationship between differential invariants, invariant differential equations, and invariant differential operators.*

   ***Differential invariants are contrasted with geometric invariants**. Whereas differential invariants can involve a distinguished choice of independent variables (or a parameterization), **geometric invariants do not**. Élie Cartan's method of moving frames is a refinement that, while less general than Lie's methods of differential invariants, always yields invariants of the geometrical kind."[6]*
   and…
   "The terms "intrinsic" and "extrinsic" are confusing when trying to be defined in introductions to differential geometry, and for good reason: the standard definition of

[2] https://en.wikipedia.org/wiki/Unimodular_lattice
[3] https://www.slu.cz/file/cul/0bb6a9db-38fa-4b96-ba38-d04321df9c30
[4] https://www-users.cse.umn.edu/~olver/mf_/dia.pdf
[5] https://www.sciencedirect.com/topics/mathematics/differential-invariant
[6] https://en.wikipedia.org/wiki/Differential_invariant

surfaces at this level float between things like "a subset of A surface is a topological space. A topological space with a particular set of properties, and its definition generalizes to manifolds, which are "surfaces" of higher dimensions. A Riemannian manifold is a manifold together with a Riemannian metric, which is a kind of object defined on a space associated to the manifold. It is common to denote a Riemannian manifold by … I did not expose precisely what means (sic)to be a Riemannian manifold, but nowhere in the definition I'm alluding to is supposed that a Riemannian manifold is inside some Rn.

Before proceeding, an analogy may go well (although, as all analogies, it is not perfect). Consider your nickname: "bubba", as defined by a concatenation of characters. Do you need a paper in order to conceive your name? Or a blackboard? Your nickname has an abstract existence on itself. If I were to ask, say: "How big is the 'u' on your name?", this question would make little sense. It depends on how you write it on paper. The length of the letters is an extrinsic property. However, having five letters is an intrinsic property: it doesn't matter how/where it is written, it is a result of how your name is defined.

Now, moving on. We then usually say that a property of a Riemannian manifold …
Intrinsic properties receive this name because they do not depend on how you envision them, only on the structure the spaces have.
This has a lot of theoretical and practical applications. But I think there is a reason why this terminology is not so abundant in all mathematics, and it is due to the practical applications of geometry. For example, Gauss's result that the curvature is an intrinsic information is marvelous: it says that something that you can define using the way that a normal vector field varies (and a normal vector field clearly depends on how you put your surface in space) can be computed directly through measures which are related to the tangent space and the Riemannian metric (namely, the first fundamental form - it may not be clear how the tangent space is something intrinsic if you think about it geometrically, so I suggest you look up for one of the abstract definitions of tangent space), and therefore are intrinsic - it doesn't matter how you are "inside" space. In fact, it doesn't matter that you are "inside" space.
*For instance, this has a lot of importance in general relativity (although the setup is not exactly Riemannian manifolds): you may have heard that spacetime is curved. This terminology can be quite confusing, and **sometimes people try to explain the concept by analogy with how balls curve a rubber sheet etc.** However, a big part of the success of the theory is precisely that **we don't need that our space is curved inside anything**: we don't need to ask "what is outside", and it doesn't make sense a priori (and it should not). It is "curved" in a way that we can define only by means of itself, making it measurable and not a pseudo-science concept.*
Now, back to the beginning, it is perfectly understandable that the "intrinsic/extrinsic" duality (and its usefulness) is a little cloudy if you do not know the abstract definitions. If the above discussion does not clear some things up, I think it may be wise to wait for (or go for) the abstract definitions."[7] (**emphasis** added)

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[7] https://math.stackexchange.com/questions/2206328/intrinsic-vs-extrinsic-properties-of-surfaces

2. Crothers is trying to explain, in a succinct way, that there is a form of mathematical rigor that is required in the use of this geometric space, despite the facts of differential invariants being contrasted with geometric invariants. (I think). In other words, Einstein wanted his cake, and to eat it, too. Note the period of mathematics is "coincidentally" to the time of the discovery of (a) discrete quantized energy[8] and (b) mass energy relation[9] for which Einstein nabbed credit (without dissuading this fame) and paid off his wife with his Nobel Prize money.[10]

This is the if-then of Crothers argument

3. The then portion of this followup, is a nested logic from the "else" of the previous if-then. Because the mathematics used (a special case - the "cake") is invalid within the rules and properties of "pure mathematics" (not adulterated by duplicist physicists), then we have to presume there are other problems. But within this is an implied *else* and we see another set of if-then.
4. He is directly saying that Einstein is reliant upon his "cake" for the entirety of the "Universality" of General Relativity. Without this leg[11], the table falls.
5. The simple, but an effective coup-de-gras is provided here. Nothing more needs to be said because it is the literal opposite of the modern internet, resulting from cognitive dissonance and Dunning-Kruger: the non-sequitur. In this case, everything follows, and is entirely 'sequitur.' The take down is effective *by itself*, and yet Mr. Crothers proceeds to put on a clinic, both in the "main" part of the paper, and the highly rote Appendix.

I want to just cover a couple other points out of the main part of the paper. It isn't long and I recommend people give it a thorough read, even the Appendix.

> *"In the original derivation of his field equations for the gravitational field, Albert Einstein invoked unimodular coordinates, which are characterized mathematically by the condition $-g^{\frac{1}{2}}=1$, where g is the determinant of the metric tensor, "whereby the equations of the theory experience an eminent simplification." (6) Although the unimodular condition is not mandatory, the related field equations must still hold in the general theory of relativity. (7) Demonstration that the unimodular field equations are invalid is sufficient to prove the invalidity of the general theory of relativity."[12]*

6. Remember, Einstein is invoking the coordinates for special use: to write the field equations explicitly in unimodular coordinates[13].
7. If-then-else. This is simple and effective logic in a "most-modern" deconstructionist era. Remember the GR is the deconstruction of classical physics, and the PEM construct

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[8] 1877 L. Boltsmann https://en.wikipedia.org/wiki/History_of_quantum_mechanics

[9] 1900 H. Poincare https://en.wikipedia.org/wiki/Henri_Poincar%C3%A9#Mass%E2%80%93energy_relation

[10] http://content.time.com/time/specials/packages/article/0,28804,1848817_1848816_1848815,00.html

[11] Note this is not the only leg Crothers has taken from Einstein in the past.

[12] Ibid. Introduction, pp. 1

[13] I am beginning to wonder why Stephen is just now getting around to this line of attack, it seems too fundamental.

stands in *relative* opposition so far. Later in the year or next year, PEMC will replace GR with a better form.

> *"Einstein introduced his **pseudotensor** in order to make his theory conform to the usual (8) conservation of energy and momentum for a closed system: "It must be remembered that besides the <u>energy density of the matter</u> there must also be given an energy density of the gravitational field, (9) so that <u>there can be no talk of principles of conservation of energy and momentum for matter alone</u>."[14] Although his pseudotensor is not a tensor, (10) its use is justified by Einstein on the grounds that it acts "like a tensor" under linear transformations of coordinates." (emphasis mine)*

8. Crothers has gone beyond the normal and consulted with Einstein himself, and here we see some of the perverted line of thinking - scientifically speaking - that was being introduced. First, there is/would be a problem with conservation of energy-mass. This is due to the effect, in my opinion, of introducing a one mass object in an unbounded closed condition. A pseudo-Universe, in effect. A thought experiment, gone awry. Then he wants to assume/presume the energy density of the gravitational field.
    Only one of two things can be true:
    Either a) one would discard the energy density of field structures all over or b) one would include the field energy density of *all* fields, gravitational, electric, magnetic, anti-matter, Big Bang theories, and for Dark Universe components. Giving the benefit of the doubt some of these did not exist in literature at the time. Therefore at least the EM fields should included in the analysis. But this has not been done, ergo it is a *perverted* (as in altered for specific agenda) version of the Universe.
9. Then he takes the step to try to cut off the discussion without the gravitational field. Couldn't this be done to him with EM fields? Yes, it can, and should. His work would not survive. The fact of the matter is that *all* observations, gravitational or otherwise, have been made with EMF (light) and through the medium of plasma and EM fields - and **no other mechanism has been shown to be relevant, pertinent, or existent**.

> *(10)"But Ricci-Curbastro and Levi-Civita proved, in 1901, that first-order intrinsic differential invariants do not exist.[15] (11) His pseudotensor is therefore invalid. Consequently, Einstein's unimodular field equations are invalid. Therefore, his general theory of relativity is invalid."*

10. This is, in essence, a true coup-de-gras from Einstein. This work will be more mathematically fundamental. The pseudotensor, as it turns out, is just pseudoscience.
11. Again, If-then-else. Classic and effective. We use it in computer programming and engineering for a reason. It is mathematically sound, and co-determinant in the Force related space of electronics and circuits. There is a kind of echo between the proof of boolean logic and electronics engineering (and so therefore software engineering). The

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[14] 3. A. Einstein, The Meaning of Relativity (Princeton University Press, Princeton, NJ, 1922)." (footnotes from Crothers' References)
[15] "5 G Ricci-Curbastro and T. Levi-Civita, Matem. Ann B. 54. 162 (1901)." (from Crothers References)

rigor of proof needed for if-then-else is not worthy of our time here. Suffice it to say, it works for everyone, while GR only works for members of the Einstein cult of personality and those using the Authority Fallacy, as I've covered elsewhere.

(12) *"Any attempt to formulate a set of field equations in terms of the alternative Landau–Lifshitz pseudotensor cannot surmount this outcome, because it too, upon contraction, produces a first-order intrinsic differential invariant."*[16]

12. I can only assume he included this as either a presponse[17] or response to a perceived "but…" from the physics or mathematical community. I cannot confirm or deny this here, and one should refer to the work Crothers does in the paper to back up this assertion. Logically, it is a sound statement.

I recommend people read the remainder of his work. It is an exercise in brain-jump-rope, on account of the material. This goes to show how the cult tries to hide responsibility for their failures behind a cloak of secrecy and elitism, which turns out to be an out and out sham. But we shouldn't be surprised about this. Much of modern Science has turned out to be a sham with continual failures of the Dark Universe[18], Big Bang[19], SUSY and String Theory[20], as well as MOND or other side theories[21]. However, will these groups stop and ask themselves *why* they are having fundamental problems? No, I do not believe so.

Because of the echo chambers with which journals, institutions, labs, and big money (and awards) insulate them from the crowd and the rigor of real intelligent research. Nevertheless, it does give us plenty of enjoyment and an excuse to have fun. It is maddening, but men like Mr. Crothers make it a bit more enjoyable. I highly recommend a review of his most hilarious presentations. While a table only has four legs, Stephen goes out of his way to make sure he knocks out eight of them, just for good measure.

Sincerely,
Sf. R. Careaga

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[16] Ibid. Conclusion

[17] Strategically speaking, anticipating your opponents serves both as a good "art of war" stratagem and an effective way of demonstrating the mastery of the material, and ancillary material. I've seen "attempts" to "debunk" Crothers which attack his credibility in mathematics, which is unwarranted, and some of the lowest drivel in quackedemia.

I've seen similar attacks upon Piere-Marie Robitaille and others, from people who clearly have little to no energy spent in reviewing the material deeply. This goes to show that a high TIQ does not equate a high IQ, and vice versa.

I am saying, in a long winded way, that he shouldn't have to do this, but that he does only supports, not undermines, his argument.

[18] DUD 1.x

[19] DUD 2.x

[20] DUD 4.x

[21] DUD 5.x - like Acoustic Shockwave Theory, or Negative Mass, etc.