# Can geometry produce work?

GR textbooks begin with a "massive body" (Wikipedia) that *somehow*, and for some unknown reason, would create particular influence in *non-flat* 4D spacetime (watch the clip below), and then "the Christoffel symbols play the role of the gravitational force field and the metric tensor plays the role of the gravitational potential", etc.

Can non-tensorial Christoffel symbols produce **work**? What kind of "influence" is that? It doesn't look like electromagnetism. All we know for sure is that gravity can alter the *rate* of time, as demonstrated in GPS navigation and time dilation. But again, the *rate* of time (W.G. Unruh) cannot produce **work** either.

Let's read the experts in GR. Quote from John Baez and Emory Bunn, *The Meaning of Einstein's Equation*, January 4, 2006, Sec. Spatial Curvature:

"On a positively curved surface such as a sphere, initially parallel lines converge towards one another. The same thing happens in the three-dimensional space of the Einstein static universe (cf. Einstein 1918 and Hubble – D.C.). In fact, the geometry of space in this model is that of a 3-sphere. This picture illustrates what happens:
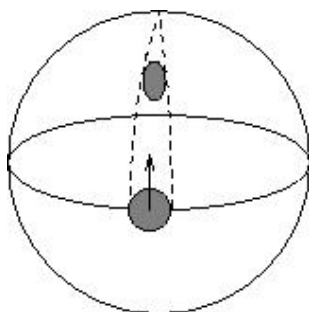
"One dimension is suppressed in this picture, so the two-dimensional spherical surface shown represents the three-dimensional universe. The small shaded circle on the surface represents our tiny sphere of test particles (say, an apple – D.C.), which starts at the equator and moves north. The sides of the sphere approach each other along the dashed geodesics, so the sphere *shrinks* (emphasis mine – D.C.) in the transverse direction, although its diameter in the direction of motion does not change."

This last sentence may sound comprehensible only to my dog. I can certainly see that "the sphere shrinks" in the drawing above, but the 'shrinking' *itself* cannot produce **work**. Apples are *physical* objects, not some fictitious "vacuum" devoid of matter. Let me offer an explanation of the question posed in the title.

Consider two kitchen scales, A and B, on a table at rest, and two apples on them, with different weight, say, an apple with 200g on scale A, and another apple with 400g on scale B. How would you relate their "trajectories" in 4D spacetime to the non-tensorial Christoffel symbols, so that the latter will produce different **weight**?

Obviously, an apple with weight 400g will resist acceleration *harder* than 200g apple. Obviously, *something* is doing **work** by pressing the scales A and B on the table.

What is it?

If you can answer this question in the framework of GR, you may discover the coupling of geometry to matter sought by Felix Klein, David Hilbert, and Hermann Weyl, among many others. Also, you might (eventually) *vindicate* the claim by Kip Thorne and his LIGO collaborators about their "discovery" of so-called GW150914 (p. **13** in Zenon). You might also qualify for Nobel Prize for your astounding discovery of renormalizable perturbative quantum gravity based on "gravitons" with mass $m_g \leq 7.7 \times 10^{-23}$ eV/c^2: see the ground-breaking experiment proposed by Kip Thorne at p. **24** in BCCP. Good luck.

If you cannot answer the question, read Über Die Gravitationsfeldrelativitätstheorie. In an nutshell, gravity can produce enormous work (for example, Earth tides), but we need first to explain why we observe only one "charge" with positive energy density. This is totally unexplained puzzle, and theoretical physicists talk only about 'positive mass conjecture' (references are available upon request). The idea suggested in GTR is very simple: recall QM operators (*ibid.*, p. **7**). They are *not* geometric points. They take some stuff, denoted **P**, at the input and convert it into *another* stuff **Q** at the output. The latter becomes *physical* stuff (**Q**), which is 'geometric point' that can be located at the apex of the light cone. But **P** (from **Plato**) is *not* on the light cone. We observe only **Q**-stuff, with positive energy density only. So, QM operators act **P** $\rightarrow$ **Q**.

For comparison, consider another operator from particular pattern (Gesetzmäßigkeit): if I gently stroke Linda's head (**L**), she will wave her tail (**Q**): **L** $\rightarrow$ **Q**. In this case, I can track the entire sequence of events in **L** $\rightarrow$ **Q** with light. Not so in QM: **P** is *physically* unobservable, as we know since 1935, thanks to Erwin Schrödinger.

The *origin* of gravity is also **P** $\rightarrow$ **Q**, because again we observe only **Q**-stuff, once at a time, as recorded with a physical clock: read **A4** on p. **4** in GTR. Namely, the **Platonic** origin of quantum gravity (**P**) does *not* live on the light cone. We can see with light only its waving *tail* (**Q**). People claim that the trajectory of the *physicalized* tail implies some non-flat 4D spacetime (watch the clip below). But we cannot see our Linda (**P**). She has *already* disappeared at the very instant of observation, just like Macavity. See Escher's 'drawing hands' and my note on the spacetime interval here.

To sum up, the *origin* of gravity (**P**), also called 'John', does *not* act on any physical stuff. What actually acts on the physical world is the *physicalized* 'John's jacket' (**Q**). And since in **P** $\rightarrow$ **Q** the former is *physically* absent, the latter (**Q**) becomes *self-acting*, like your brain. Hence the *origin* of classical gravity (**P**) is *not* physical field, but Q is. Yet **Q** only *facilitates* the Platonic origin of gravity (**P**). Have your cake and eat it!

Moreover, GTR offers the path to quantum gravity from the outset: read my endnote here and pp. **2-4** in Gravitational Energy, and notice the Heraclitean *flow* of events (recall the puzzle above) depicted with the vector **W** in the drawing at p. **8** therein.

Further information is available only to qualified individuals: read the last paragraph of p. **15** in Über Die Gravitationsfeldrelativitätstheorie.

Feel free to download the latest version of this paper from this http URL.

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General Relativity : Einstein vs. Newton
https://www.youtube.com/watch?v=DdC0QN6f3G4