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 (pp. 6-7 in BCCP), 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 ($P$), called also ‘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 ($P$), like a hand in 4D glove ($Q$).

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.
Needless to say, Einstein was fully aware of the problems in his General Relativity (see p. 13 in *Gravitational Energy*):

The right side is a formal condensation of all things whose comprehension in the sense of a field-theory is still problematic. Not for a moment, of course, did I doubt that this formulation was merely a makeshift in order to give the general principle of relativity a preliminary closed expression. For it was essentially not anything more than a theory of the gravitational field, which was somewhat artificially isolated from a total field (Gesamtfeld) of as yet unknown structure.

My theory is also incomplete, firstly because “the total field (Gesamtfeld) of as yet unknown structure”, suggested by Plato many centuries ago (p. 9 in *BCCP*), lacks mathematical presentation: we need new *Mathematics*.

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**Addendum 1**

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

“In Einstein’s model space-time is distorted.” Fine. But there is no **explicit** time parameter $\tau$ in GR: read Carlo Rovelli, Bill Unruh, and Charles Torre. Why? Because the Heraclitean flow of Time, shown with the radius of the ‘inflating balloon’ (Hubble), is missing in Einstein’s equations. The misleading drawing by John Baez and Emory Bunn above shows “Einstein static universe” from 1918 **without** the crucial **unphysical** inflating radius.

We read that “space acts on matter, telling it how to move. In turn, matter reacts back on space, telling it how to curve.” (J.A. Wheeler, p. 1 in *Gravitational Energy*.)

Fine. But which goes **first**? Space acting on matter (telling it how to move) or matter acting on space (telling it how to “curve”)? See again Escher’s ‘drawing hands’ and my note on the spacetime interval $\Delta s^2$ (R.M. Wald, Ch. 11, p. 286) here. Simple, isn’t it?

In GTR, the statement by J.A. Wheeler above is amended as follows:
Spacetime acts on matter, telling it how to move-and-rotate. At the same instant, matter acts back on spacetime, telling it how to alter the rate of Time in the invariant spacetime interval $\Delta s^2$.

Namely, the local deflation of $\Delta s^2$ creates attractive gravity, like going from Bob (B) to Alice (A), and the local inflation of $\Delta s^2$ creates repulsive gravity, like going from Bob (B) to Carol (C): p. 12 in GTR and p. 2 above. See the ‘general rule’ ($1 + 0 = 1$) in p. 2 in Gravitational Energy and the ‘drawing hands’ below.

The Platonic hand (P) in 4D glove (Q). Examples from QM in The Physics of Life.

The arrow of Time cannot be modeled with temporal orientability of spacetime: see the enormous smashing errors by Robert Geroch and Gary T. Horowitz in 1979 here. The orientability of 3D space by “a choice of spatial parity” (“left-handed and right-handed triads”, *ibid.*) is also false. The fact that in 3D space we can invert 2D left rubble glove into its mirror image of 2D right rubber glove (parity inversion) does not represent the fundamental asymmetry in spacetime topology: time reversal symmetry ($t \leftrightarrow -t$) and left glove $\leftrightarrow$ right glove symmetry (parity inversion) do not model the fundamental asymmetry along the 3D “axis” of Small and Large. That is, if you have a large 3D ball in front of you, you cannot “invert” it inside-out, so that you will wind up inside the ball. Do you know how mathematicians would catch a lion in Sahara? Check out p. 19 in Hyperimaginary Numbers and Mark Armstrong at p. 26 in BCCP.

The non-trivial topology of spacetime is a big can of worms, which has been quietly swept under the carpet by the established mathematicians and theoretical physicists.

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

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Addendum 2

This is what we know about gravity: read William G. Unruh and compare the local rates of time read by the two (highlighted) clocks in the animation (time.gif) below.

Read the principle of GTR at p. 4 above. There is no explicit time parameter $\tau$ in GR: read Carlo Rovelli and Charles Torre, as well as Adam Helfer, Mihaela Iftime, and my comments at p. 4 in The Atemporal Platonic World. The latter is always nullified in the squared spacetime interval $\Delta s^2$ (R.M. Wald, Ch. 11, p. 286): click here. If it were possible to “discover” a local expression for gravitational field energy density (ibid.), the gravitational field will be local tensorial observable (L. Szabados and MTW p. 467) and gravity will become a classical force field. Therefore, GR cannot be a bonafide classical theory. But it cannot be quantum theory either. We need quantum gravity. We need Mathematics.

More in Über Die Gravitationsfeldrelativitätstheorie and Gravitational Energy.

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