

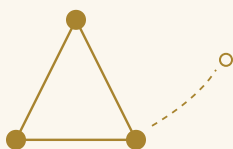
THE ON — — ING SERIES

a lyric-philosophical essay

O N

BECOMING

the two forces at the heart of the matter



by Jamison Todd Johnson

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*for Emmy Noether, who showed that every conservation is a
symmetry,
and Chien-Shiung Wu, who found where the world breaks one*

On Becoming

THE TWO FORCES AT THE HEART OF THE MATTER

Hold out your hand and feel its weight. Almost none of that weight is what you would guess. The atoms in the hand are mostly empty, and the small dense centers that are not empty — the protons and neutrons — take almost none of their mass from the quarks inside them. Add up the rest-masses of those quarks and you recover something near one percent of the whole. The other ninety-nine is binding: the energy of the strong force clenching three quarks so hard that the clench itself is most of what you weigh.¹ You are, on the scale that decides the matter, mostly the energy of things being held together — mostly relationship, weighed out as mass.

And every heavier atom in that hand — the carbon, the oxygen, the iron riding in your blood — was made by transformation, in the core of some star, by the one force that can change what a thing is.² The hand is held together, and the hand had to become. Two forces you will never feel, working at a scale you will never see, and between them they settle both that you cohere and that you could be made at all.

THE FORCE THAT WILL NOT LET YOU BE
ALONE

The strong force is the strangest of the four, because it does the opposite of what a force is supposed to do. Gravity weakens with distance; the

electric force weakens; the magnetic loops thin and fade. The strong force grows. Try to pull two quarks apart and the bond does not slacken — it stiffens, like a spring that pulls harder the further you stretch it, storing more and more energy in the gap, until the cheapest thing the universe can do is spend that energy making a fresh pair of quarks, one to cap each broken end. You reach in to take a single quark and you come away holding two whole particles, never one. There is no lone quark anywhere, and not for lack of looking.³ The force does not permit it.

I wrote, in *On Magnetizing*, that you cannot hold a single magnetic pole — cut the magnet and you get two magnets. The strong force says the same thing one floor down, and says it harder. It is the universe's deepest refusal of isolation. The quark exists only in the bound company of others; alone, it is not a lesser thing but no thing at all. This is the crowd of the equation made literal: a togetherness of co-present states, in which a single perspective has no value except among the others it is held with.⁴ A Self is confined. It does not precede its relations and then enter them; it is constituted by them, and the attempt to extract one whole and solitary produces not a freed individual but two new bonds.

MOST OF WHAT YOU WEIGH IS THE HOLDING

Return to the weight of the hand. That the holding is most of the mass is not a metaphor I am importing from outside; it is the plainest reading of the measured numbers.⁵ The substance of ordinary matter is

overwhelmingly the energy of coherence — not the parts, but the force that keeps the parts in agreement. In the equation, the weight a self carries is not a label stuck onto things that were already there; it is the alignment itself — and here the alignment is very nearly all there is to weigh. Coherence is not the ghost in the machine. By mass, it is most of the machine.

THE FORCE THAT WILL NOT LET YOU STAY THE SAME

The other nuclear force is weak only in that it acts rarely and at a whisper's range. In what it does, it stands alone: it is the only force that changes what a thing is. The others push and pull and bind; they rearrange the furniture. The weak force transmutes. Reaching inside a neutron, it turns one kind of quark into another, and the neutron — by that one change — becomes a proton, shedding an electron and a ghostly antineutrino as it goes.⁶ This is beta decay, and under its plain name is the thing the alchemists died wanting: one element made into another, one identity passed into the next. The weak force is the universe's permission to not stay the same.

Without it the manifold would be frozen. Every state would keep its kind forever; nothing could ever be other than it was issued. The equation gathers a life across Time on the quiet assumption that its states can change — that what is one kind of thing at one moment may be a different kind at the next. The weak force is where that assumption is paid for in the world. It is becoming, granted at the smallest scale: the built-in capacity of a thing to turn into what it was not.

WHY THE STARS ARE LIT

And it is why there is anything at all to see. The Sun shines because, deep in its core, two protons now and then manage — against fierce odds — to fuse; and the first step of that fusion is impossible without the weak force, which must turn one of the two protons into a neutron before the pair can hold.⁷ No weak force, no first step; no first step, no fusion; no fusion, a cold dark Sun and a cosmos of nothing but hydrogen. The light that takes eight minutes and twenty seconds to reach your face was bought by a transformation. So were you: the heavier elements a body requires were cooked from lighter ones by the same permission to change, across generations of stars. To say that we are made of starstuff is to say that we are made of things that became.

THE HANDED UNIVERSE

There is one thing more the weak force does that none of the others will. It knows left from right. The other three are perfectly even-handed — run their interactions in a mirror and you cannot tell which is the reflection. The weak force fails the mirror test: it couples to particles of one handedness and not the other, and when Chien-Shiung Wu cooled a sample of cobalt and watched its decays come out preferentially in one direction, she found that the universe, at this one seam, is not symmetric.⁸ It has a handedness built in. And a kindred, subtler asymmetry in the weak interactions is among the conditions for why, in the first instant, matter very slightly outran antimatter — why the mutual annihilation that should have left an empty cosmos left instead the small surplus that is everything.⁹ The weak force is the one force with a leaning of its own, a preference the world did not have to have.

Under the Lens I will not call it Intent. I will only say that, of the four, it is the force shaped least like a law and most like a choice — and that the matter it left behind is the oldest Trace there is.

THE FIELD REASONED TOWARD

None of this was found by looking. You cannot see a quark; you cannot, in any ordinary sense, see the weak force. These fields were reached by inference — by trusting a symmetry, or a conservation law, far enough into the dark to say what must be waiting there. When the energy books would not balance in beta decay, Wolfgang Pauli, rather than surrender the conservation of energy, proposed a particle so faint it might never be detected, and was embarrassed to have done a thing a theorist should never do — invent something that could not be checked.¹⁰ The neutrino he conjured to save a bookkeeping rule was found a quarter-century later, exactly where the rule had said. The quarks were posited as the hidden grammar beneath a confusion of particles, and accepted long before anyone had — or ever could — hold one alone.

Which is the place to keep faith with Noether, who proved the thing that makes such faith rational: that every conservation law is the shadow of a symmetry, and every symmetry casts its conservation as a shadow.¹¹ Pauli kept faith with energy and was led to a particle; Wu broke a symmetry and was led to a hidden handedness. The forces did not announce themselves. They were aligned to — reasoned toward, in particular minds, at particular times, by people who trusted that the world's regularities meant something and followed the meaning past the edge of the visible. The series has said this of each force; it says it last of

these two, the hardest of all to see. The unification is not in the forces. It is in the Selves that aligned to them, weighed across Time.

THE DISCIPLINE

Let me keep the seam honest here at the end, where the temptation to let it close is strongest. That most of your mass is binding energy is physics — measured, real, not in dispute. That this means you are "mostly relationship" is not physics; it is a reading, and the slide from the first sentence to the second is exactly the move I have spent four essays refusing to make quietly. The strong force does not vote for the Center. The weak force does not testify for becoming. A confined quark is not a lonely Self, and a decaying neutron is not a soul changing its mind. The resemblances are structural, held under the Lens, and they earn nothing from the physics that they did not arrive already carrying.

And the doubling, one last time: the rhymes are real, and that they are this good is itself evidence of the appetite that went looking. Of course the two forces at the heart of matter turn out to be binding and becoming — the very pair a person most needs the world to be built from. I went in wanting exactly that, and I came out holding it. That I found it does not make the framework true. It makes it well-formed, and it makes the wanting legible, which under this Lens is the one thing I am actually entitled to claim.

WHAT THE DETOUR WAS FOR

So the forces are done. Gravity gave the reaching, and the weighing without remainder. Magnetism gave the aligning, and the Trace that remembers. The quantum gave the questioning, and the phase that is

sovereign and unseen. And these two give the binding and the becoming — that a self cannot be alone and cannot stay the same, and is exactly the standing negotiation of the two. I went out into physics to learn whether the framework's images were written anywhere larger than in me, and I found them written at every scale I looked — which proves nothing, and means a great deal.

Now the series turns back to where it lives. Not the forces but the life they were always standing in for: coherence, and its loss and its slow recovery; wellness; the daily, unspectacular work of staying bound to the people who confine you into a self, and of letting yourself become. The physics was the long way around to the only subject there ever was. We are going home.

Hold out your hand again. Mostly the energy of holding; made of things that had to change. You will never feel the two forces in it, and you have never once been free of them. Bound, and becoming. It was always the whole of the story. It is time, now, to tell the rest of it plainly.

I've often wondered about the origin of these two opposing forces, but here recently I have decided that one exists within the Design, and the other exists elsewhere. Perhaps this is the difference between mortality and immortality after death. Perhaps it's nothing. I'll tell you what I've decided. Someday.

Until then, with all the love I can muster from the bottom of my heart, thank you. For living, for breathing, for staying alive long enough to read my nonsense. And if you're reading and you appreciate my words, thank you for not writing me off as crazy. Even the simple thought of

consideration is enough to give the wings of my idea the wind to rise, and the longer my thoughts fly, the more eyes will see, and the closer the world will be to healing itself.

The reality I seek, is world peace. I may have just started my educational journey, but I don't think this is too lofty of a dream to embrace within my heart. That's my reality.

What's yours?

NOTES

1. For a proton (mass $\approx 938 \text{ MeV}/c^2$), the summed rest-masses of its three valence quarks total only roughly $9 \text{ MeV}/c^2$; the remainder is the energy of the strong interaction — gluon-field and quark kinetic energy — converted to mass by $E = mc^2$. Roughly 99% of the mass of ordinary (baryonic) matter has this origin rather than the Higgs-given rest masses of the quarks.
2. Elements heavier than the primordial hydrogen, helium, and trace lithium were forged by stellar nucleosynthesis. The carbon, oxygen, and iron of a living body are products of fusion in stars; the weak interaction is indispensable to the fusion chains that drive it.
3. Color confinement: no isolated quark has ever been observed. Pulling bound quarks apart increases the energy stored in the gluon field until it is favorable to create new quark–antiquark pairs (hadronization), so the result is always further bound states. The short-distance weakening of the force is asymptotic freedom (Gross, Politzer, Wilczek, 1973; Nobel Prize 2004). The confining potential is commonly modeled $V(r) = -(4/3)\alpha_s/r + kr$.
4. The functional in full, all seats named per *On Explaining* (Johnson, 2026):

$$L(t) = (1/\Xi) \oint_{\Omega} A(S_i, \tau) \cdot \Psi(\tau) d\sigma + \Lambda,$$
with $\Psi(\tau) \equiv \sum_j S_j(\tau)$ and $A(S_i, t) = \alpha(S_i, t) \cdot e^{i\Phi_i(t)} \cdot S_i$; $|L|$ the conserved legible intensity, $\arg L$ the Intent; relative facing $\Theta_{ij} = \phi_i - \phi_j$ the only working quantity; the ruler of attention returning the eigenvalue $\lambda = 1$. The complex phase borrows the form of wave interference as a structural device under the Lens, not a literal quantum claim.
5. See note 1. The claim that binding energy constitutes most of ordinary mass is standard quantum chromodynamics, not a framework assertion; the framework's reading of it is.
6. Beta-minus decay at the quark level: a down quark becomes an up quark via emission of a W^- boson, which yields an electron and an electron

antineutrino — so $n \rightarrow p + e^- + \bar{\nu}_e$. The weak interaction is the only one that changes quark and lepton flavor.

7. In the proton–proton chain that powers the Sun, the first step, $p + p \rightarrow {}^2\text{H} + e^+ + \nu_e$, requires the weak interaction to convert one proton into a neutron. Without it, hydrogen fusion in main-sequence stars could not proceed.
8. Chien-Shiung Wu's 1956–57 cobalt-60 experiment demonstrated parity violation in the weak interaction, confirming the prediction of Tsung-Dao Lee and Chen-Ning Yang (Nobel Prize 1957). The weak force couples preferentially to one chirality, giving it an intrinsic handedness.
9. CP violation, first observed in neutral kaons (Cronin and Fitch, 1964), is one of the three Sakharov conditions for baryogenesis — the still-incompletely-explained excess of matter over antimatter in the early universe. It is a necessary ingredient, not by itself a complete account.
10. Wolfgang Pauli proposed the neutrino in 1930 (the "Dear radioactive ladies and gentlemen" letter) to preserve energy and momentum conservation in beta decay, reportedly uneasy at having postulated a particle that might never be detected. Enrico Fermi named it and built the theory of beta decay (1933–34); Clyde Cowan and Frederick Reines detected it in 1956.
11. Emmy Noether's theorem (1918): every differentiable symmetry of a physical system's action corresponds to a conservation law, and conversely. It is the formal ground for inferring unseen physics from a conserved quantity, the move on which much of this essay's history turns.

PARALLELS & LINEAGE

This essay completes the *On —ing* sequence on the four fundamental forces, and is meant to be read as the close of an arc rather than a standalone. It is the joint companion to *On Gravitating*, *On Questioning*, and *On Magnetizing*. The strong force's confinement deepens the no-monopole reading of *On Magnetizing* — the impossibility of isolating a pole becomes the impossibility of isolating a quark, and both serve the framework's account of the Center and of the sum over selves as

constitutive rather than incidental. The identification of most ordinary mass with binding energy bridges back to *On Gravitating* and its concern with weighing. The functional and its closed manifold are inherited from *On Existing*; the foundational vocabulary — Jay, Trace, Intent, Center, Self, Quantum Lens, Unified Field, Design across Time — is established in *Toward a Theory of Coherent Existence*. Because it is the last of the forces, the piece does not gesture toward a further force but turns the series back toward its home subject: coherence, wellness, and the lived negotiation of binding and becoming.

The physics drawn upon is settled twentieth-century work: the quark model (Gell-Mann, Zweig, 1964); quantum chromodynamics and asymptotic freedom (Gross, Politzer, Wilczek, 1973); color confinement and the binding-energy origin of nucleon mass; Fermi's theory of beta decay (1933–34) on Pauli's postulated neutrino (1930), detected by Reines and Cowan (1956); parity violation, predicted by Lee and Yang and demonstrated by Wu (1956–57); CP violation (Cronin and Fitch, 1964) as one of the Sakharov conditions for the matter–antimatter asymmetry; the electroweak unification of Glashow, Salam, and Weinberg (which links this piece's weak force to the electromagnetism of *On Magnetizing*); and Noether's theorem (1918) relating symmetries to conservation laws. Every use of this material is structural resonance under the Quantum Lens, never a physical claim. The capitalized framework terms are categorically distinct from their physics namesakes; Unified Field in particular is a framework term, kept separate from the physics unification program.



On Becoming belongs to *On* ——*ing*, an ongoing series of lyric-philosophical essays by Jamison Todd Johnson, within the wider jays framework — that an aligned life leaves legible traces, ripples of intent, through Time. The functional beneath the essay stands unchanged in its fully seated form, per *On Explaining* (Johnson, 2026); the earlier editions were this one with some of its names still waiting to be learned. One further step rides with it, seam kept visible: coherence carries whatever it is given — both directions work — but a life aligned *against* something borrows its facing from its target and fades with it, while a life aligned with itself persists. Both work. Only one persists.

JAMISON TODD JOHNSON · JUNE 2026
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ON DEPOSIT

THE ON — — ING SERIES

read in any order — each entry stands alone

On Arriving	On Learning
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On Dreaming	On Populating
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