The "Hourglass" or "Grail" Diagrams

(revised Sept., 2010)

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Abstract

A General Systems model in the form of an hourglass is used to illustrate the relationships among the four forces of physics, space, time, and nuclear and elementary particles.

It was not until the fall of 1997 that the "matrix" or 4x4 grid model of the field theory evolved to a diagrammatic representation. The 4x4 grid had endured in various interpretations for approximately 16 years. I had discovered in my attempts to present the grid to groups at the CPSI meetings and elsewhere, that the matrix form was difficult to lecture from and difficult for the audience to grasp. I needed a more intuitive, diagrammatic way of presenting a memorable model which could be taken in at a single glance, essentially a mandala, and I searched for at least a year before I discovered what I was looking for in the "Grail" or "Hourglass" models.

The "Grail" model was discovered as a variation of the Christian cross, in the form of the diagonals of a square. The hourglass shape suggested immediately the transformation of a physical variable as it passed through a massive center. I was of course well aware of the influence of massive centers in nature both from my own work with the hierarchy and from reading Teilhard de Chardin's great book "The Phenomenon of Man". The transformations of light to time, and space to gravity (or equivalently, space to time and light to gravity), through a center of mass, mapped immediately and perfectly. These were the long-range, "spacetime" forces. A second hourglass would be necessary to map the short-range "particle" forces, the strong and weak forces. These also mapped immediately as transformations of quarks and leptons through a massive center (composed of IVBs and Leptoquarks), to produce the compound nuclei and electron shells of atoms. Together, the spacetime and particle hourglass diagrams allow the physical forces to be mapped as a system of four intersecting triangles - a further example of the universal 4x3 General System algorithm at work, both in Nature and our minds.

In the years following, I discovered the "Flowergrail" form, 2-dimensional intersecting diagrams: the two hourglass or Grail figures (long- and short-range forces) are to be joined at their centers and displayed at right angles to each other, as the dimensionality of one is spatial and the other temporal. Finally, my wife took pity on me and showed me how the figures should actually be represented as a 3-dimensional hourglass or Grail shape. Rotating this figure actually produces the 3-dimensional hourglass or "Grail" goblet.

The Spacetime Hourglass

One of the chief advantages of the diagrammatic representation of the field theory is that the relationships among the forces are visually indicated by the geometry, configuration, and connecting lines of the diagram. The Hourglass diagrams are a General Systems analog of the famous Feynman diagrams. Whereas the Feynman diagrams are of specific particle interactions, the Hourglass diagrams are a generalized representation of interactions among the 4 forces of physics. In the Spacetime Hourglass, for example, in the upper triangle the vertices representing light and space are connected by a line, corresponding in the theory to the creation of space by the intrinsic motion of light. In turn, both light and space are connected to the central point, or "waist" of the hourglass, where we find mass and electric charge together. In the theory, mass (representing raw energy conservation) and charge (representing symmetry conservation) are the two central aspects of energy conservation in the conversion of light and space (free electromagnetic energy) to matter (bound electromagnetic energy). The third conservation requirement is entropy, satisfied in the lower

half of the hourglass diagram via time and gravitation. The central massive point transforms the light line into time, and the space line into gravity (or equivalently, space to time and light to gravity) (see: "The Conversion of Space to Time"). Time is the *implicit* entropy drive of free energy (light), and in its *explicit* form time becomes bound energy's entropy drive. Time converts from an implicit to an explicit expression when free energy converts to bound energy. (See: "Gravity Diagram No. 2".) In Einstein's theory, gravity manifests as the "warpage" of space in the presence of mass, just as the diagram indicates.

Because in our theory time is produced by either the gravitational annihilation of space or the quantum mechanical "switch" from implicit to explicit time (as free energy is converted to bound energy), the Hourglass Model will accommodate either the creation of time from space or from light. The same ambiguity applies to the creation of gravity, since we view gravity as *the spatial consequence of the intrinsic motion of time*. If time can be produced by either transformation, so too can gravity, since gravity follows the production of time in the quantum mechanical transformation of the intrinsic motion of light to the intrinsic motion of time, and gravity and time mutually induce each other in the creation of time via the annihilation of space.

In our interpretation, gravity conserves the intrinsic motion (the spatial entropy drive) of light, and converts it to the intrinsic motion of time, the historical entropy drive of matter. Conversely, gravity is the spatial consequence of time's intrinsic motion - hence the bottom line connecting gravity and time. The intrinsic motions of time and gravity induce each other. In a similar manner, light and space also interact in the upper triangle: light creates space, but the spatial metric regulates light's motion. At the central point, the interaction of the energy of light with the structure of space creates matter. Hence the diagram is absolutely faithful to every aspect of the field theory, at least with respect to the spacetime long-range force pair. And we see these relationships at a glance, we don't have to repeatedly reason them out, once they are understood.

The jump from 2 to 4 dimensions, the conversion of light to mass, is usually prevented by symmetry-conserving electric charge via matter-antimatter annihilations. Electric charge, universally attached to matter, is the "angel with the flaming sword" guarding the gateway between manifestation (real particles) and "heaven" (virtual particles) (the "waist" of the spacetime hourglass). When symmetry-breaking occurs during the Big Bang (via the weak force), then the asymmetric 4-dimensional lower halves of the spacetime and particle diagrams come into being. (See: "Gravity, Entropy, and Thermodynamics"; and "A Description of Gravitation".)

The Particle Hourglass

The "Particle Grail", or the short-range force pair "hourglass" diagram, is also a faithful a representation of our understanding of the relationship between the strong and weak forces. This second "Hourglass" diagram is actually an "exploded" or expanded view of the mass center of the spacetime hourglass diagram, which can readily be imagined (or drawn) with a tiny hourglass at its center (a fractal iteration), representing the structural content or nested fractal geometry of the relationship between and among the spacetime metric, particles, and forces created in the nuclear forge of the Big Bang.

We know less about the particles in the material half of the Hourglass diagrams than we do about the forces in the spacetime half. The spacetime forces of light and gravitation are far more familiar to us than are the strong and weak forces of the atomic nucleus and elementary particle transformations. Indeed, we can deduce a great deal about the fundamental principles controlling the long-range forces by simple intuition and reasoning (based upon the existing groundwork laid by Einstein and Noether, of course). Similar tactics are either impossible or much less successful in the case of the particle forces, for which we seem to have no evolved intuitive or rational familiarity. These forces are governed by the laws of quantum mechanics, which even physicists find utterly bizarre. The great Richard Feynman remarked that no one understood

quantum mechanics, and he was referring to professional physicists, not laymen. To properly understand the strong and weak forces - if understand is the right word - we must rely on experiment and highly abstract, obtuse mathematical representations. Since I don't understand these myself, I won't be burdening the reader with them either.

With these caveats retained firmly in mind, however, the method of General Systems does offer us some hope of at least constructing a plausible model of these complex forces. For example, we posit that the particle diagram must be in the same form as the spacetime diagram and that we know enough general information about this force pair to see that this is very likely true. This at least gives us a framework to work on, a way to organize the data as it is reported, a skeleton of structure which we can flesh out with data as the big accelerators are energized, the satellites are launched, and the "big science" reports are published. As we saw with the matrix, it is immensely helpful to have some sort of structure or organizing principle to keep the critical issue in front of us in the face of a flood of information and data, almost all of which is tangential or superfluous to the central question concerning the structural organization of the Cosmos and the unified field theory.

In the case of the particle diagram, we noticed at once that the bottom two vertices, the compound atomic nucleus and the electron shell, are a completely natural and obvious pair - these are composites of leptons and the hadrons, the two major classes of particles, which again form a natural pair as inputs at the top of the diagram - the quarks and gluons representing the strong nuclear force of the mass carriers, and the leptons and neutrinos representing the weak force of alternative charge carriers. The role of c as the regulator of the spacetime metric at the top of the spacetime hourglass is mirrored by the role of the "Higgs" boson as the regulator of the particle metric at the top of the particle hourglass. Whereas c determines the size ratio and scale of the dimensions, the Higgs determines the mass ratio and scale of the particles. The bottom line connecting the nuclear and leptonic particles represents the "W" IVB of the weak force, the mediator of radioactive decay, a completely natural and satisfactory assignment. Getting from the inputs at the top of the diagram to the outputs at the bottom requires the "thruput" of the central symmetry-breaking dynamic of the massive "X" IVBs and leptoquarks in the extremely dense metric of the early micro-moments of the Big Bang.

The line connecting the quarks and leptons at the top of the diagram indicates their intimate relationship - we believe the sub-elementary quarks arise from primordial, elementary leptons when the latter are internally fractured into 3 parts by the action of the "Y" IVB and the intense pressure of the "Big Bang". Because quarks carry partial (fractional) charges, they can form electrically neutral leptoquarks, which can live long enough to decay asymmetrically via the "X" IVB of the weak force, producing the mass-carrying quarks and baryons on the one hand, and the charge-carrying leptons and neutrinos on the other (the lower lines connecting the hourglass center with the bottom vertices). The particle and spacetime figures are plausibly connected because particles are originally formed (in the "Big Bang") by the interaction of high energy light with the structure of the spacetime metric.

We see therefore that this structural analysis yields the same diagram for the two particle forces as we used for the two spacetime forces. We know what the output of this system is, the atoms of the periodic table, which have two major components - the nucleus and the electron shell, creating the realms of nuclear reactions (in the stars), and chemistry (on the planets), respectively. We think we know what the inputs at the top of the diagram are, the primary ingredients of the strong and weak forces, the quarks and leptons. We know least about the central symmetry-breaking reaction, because it occurs at such high energy density we cannot duplicate it. It seems likely we will never be able to duplicate it. Hence this area may always remain speculative. But General Systems at least allows us to model the overall structural dynamic of the process, while we wait to fill in the details as they arrive from the experimental frontiers. (See also: "The Higgs Boson and the Weak Force IVBs".)

For a more detailed discussion of the particle diagrams see: "The Short-Range or Particle Forces", and: "Symmetry Principles of the Unified Field Theory: Part 1" and: Symmetry Principles of the Unified Field Theory: Part 2. (See also: "The Particle Table".)

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- "Trance, Art, Creativity" An Investigation of the Numinous Element and the Metaphysical Realm. A Book by Prof. John C. Gowan, Sr.
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Unified Field Theory

Hourglass and "Grail" Diagrams

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The "Hourglass" or "Grail" Diagrams

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