In Search of a Cosmic Super-Law
The Supreme "Second law" of Devolution

Abstract

The ability of the Generalized Second Law to withstand singularity, suggests this putative super-law to be even more robust and fundamental than general relativity or quantum mechanics. Profound differences, however, in the derivations of the two components of the GSL (thermodynamics and black hole dynamics) suggest a need for a new unified conceptual framework. Since Ludwig Boltzman's work in the late nineteen hundreds on statistical mechanics, there has existed the question of how the apparently time symmetric dynamic laws of Newton (and later Einstein) could coexist with the time asymmetric Second Law of thermodynamics (and later, black hole dynamics). Another unresolved problem is the question of how to apply Boltzman statistical thermodynamics to something as small as a single particle.

"Topological Devolution" is a non-statistical, space-time topology based, inverse formulation of the orthodox Second law. Along with making sense of the thermodynamic arrow at the particle level, the TD model automatically includes a space-time compressant "the devolutionary potential." This energy potential looks and behaves suspiciously like the Ricci curvature tensor of General Relativity. Furthermore, as a byproduct of this fundamental potential, many other features of a relativistic universe seem to be appearing. This seems to be more than just coincidence. If true, the GSL is the most fundamental law and force in the physical cosmos.

The name "Devolution" like its antithesis "Evolution" refers to cumulative change (of order content) over time. The Devolutionary arrow, however, points in the opposite direction to that of "Evolution." I have decided to use this particular name due to the immediate understanding of both the meaning and the implications of this new law and most fundamental cosmological force.

The paper is divided into three parts**;**

Part One -- "The Physical Incompleteness Theorem -- Verification of the Cosmic Arrow." In Part One my argument is statistical in nature. I first determine the source of directional uncertainty and recurrences in finite, partially random systems and finite thermodynamic systems. I then proceed to an examination of the physical universe as a whole, seeking an equivalent source of directional uncertainty. Finding no source of uncertainty, I thus confirm, for the universe as a whole, the singular directionality of the Cosmological Second Law and "The Physical Incompleteness Theorem."

Part Two -- In "A Murphylian Second Look at the Second Law" I provide an examination and analysis of the theoretical difficulties and challenges of the Second Law of Thermodynamics in finite systems. I take a perhaps unexpected, approach to the local

Second “Law” employing “Murphy’s Law” as a temporarily alternative. Through the use of “Murphylian Analysis” I argue for the existence a more fundamental physical law behind the presently uncertain Second Law of Thermodynamics.

Part Three -- “The Devolving Gas, The Devolving Cosmos - An Introduction to Topological Devolution.” I propose a non-statistical topo-dynamic alternative the Second Law and show how this model automatically leads to a devolutionary, general relativistic, black hole dynamic universe.

-The Physical Incompleteness Theorem-

Verification of the Cosmic Arrow

“The heavens declare the glory of God”

The first section is from the "God Proof" first section of my 1996 two part article “Hawking’s Error - Consequences of the Correction.” This article was originally published through the now defunct ISJ-Internet Science Journal appearing two sections of the journal (“Physics” and “Quantum Gravity”) from 1996 - 2000.

I shall begin with page 123 of the paperback version of "A Brief History of Time"...

"This (A chaotic boundary condition) would mean that the early universe would have probably been very chaotic and irregular because there are many more chaotic and disordered configurations of the universe than there are smooth and ordered ones..."

*"If the universe is indeed spatially infinite or if there are infinitely many universes, there would probably be some large regions somewhere that started out in a smooth and uniform manner. It is a bit like the well-known horde of monkeys hammering away on typewriters--most of what they write will be garbage, but very occasionally by pure chance (**randomness**) they will type out one of Shakespeare's sonnets(**order**). Similarly, in the case of the universe, could it be that we are living in a region that happens by chance (**randomness**) to be smooth and uniform?(**ordered**)"*

You will notice that I have placed the words "randomness" and "order" after Hawking's words. I have done this to point out that he is apparently invoking "pure chance" (absence of constraint) as a possible source of constraint. This is, of course, impossible. Just as nothing can be lit by darkness, nothing can be ordered by chance. In the same way that light must come from a source of light, so must order come from a source of order. Such a juxtaposition of opposites is a strong indication of confusion on the part of the author. Let's look deeper...

"Pure chance" is certainly not pure if you only have 26^1 letters in the alphabet. In such a finite system the monkey's choices are utterly constrained to the available letters. If the alphabet contained only one letter, then monkeys would always type "Shakespeare."(and

vice versa) In such a case Hawking would have to change his "very occasionally" position to "always." While chance is pure ^{2} over the range of 26 letters it is absolutely impure outside of that range (27 28 29...)

So Hawking is ignoring the system's inherent order. Subsequently he is confusing two different sources of order/constraint...

#1. The order/constraint produced by Shakespeare himself "Shakespeare sonnets"-- (i.e., Externally imposed order),

and...

2. The basic finite system order of the alphabet-monkey and typewriter system itself.

William Shakespeare imposed his order because he knew that a particular, very specific combination of letters would serve to express meanings to his fellow human beings that he wished to express. The typing-monkey system is itself ordered. A constant integrity(orderliness) on the part of the system is being assumed. The alphabet is finite. Shakespeare sonnets are finite in size. The entire complete works of Shakespeare are finite in size. The energy of the monkey causes the output of the system to cycle randomly through a finite set of all available letter combinations. This set remains constant for the lifetime of the system. Included in this very large set, is the exact combination of letters that we call "Shakespeare sonnets." As long as the monkey keeps typing forever, the combinations of letters that we call "Shakespeare sonnets" will, at random intervals, re-occur. This is due to the fact that those combinations are included as members of the very large system set.

Anything that anyone might choose to type will also be a member of that larger set defined by the system. Subsequently we have constraint being introduced at two different levels. We have two sources of order. The system (originally defined by humans) defines a set of all possible configurations of letters and then William Shakespeare defines a configuration of letters that is a member of the much larger system set. Subsequently, we have a definition within a definition, constraint within constraint, order within order.

To illustrate this I have drawn a circle within a circle...Fig. #1

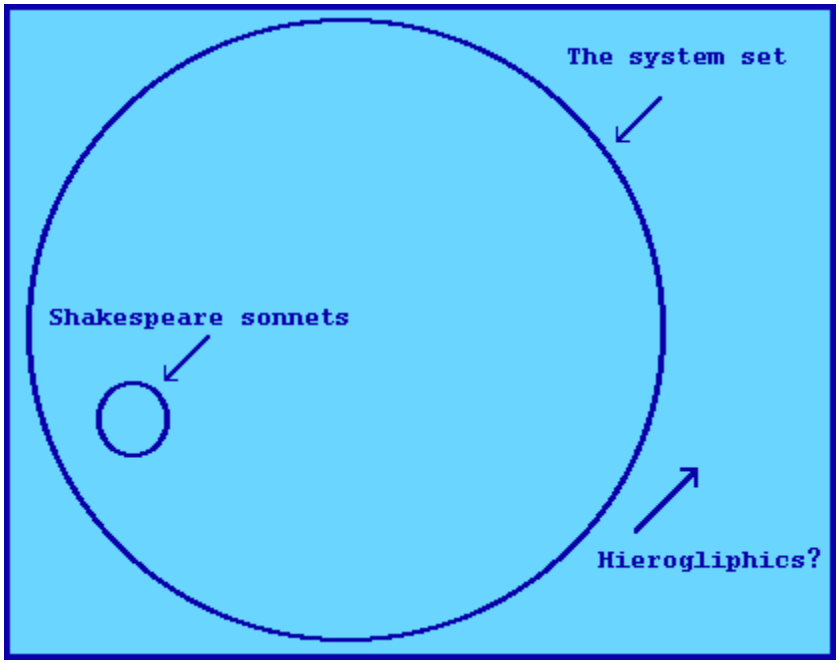


Fig. #1. (*Not drawn to scale*)
Hawking has forgotten the constant constraint of the larger system set circle.

As far as we (and Shakespeare) are concerned, the typed letters are only considered to be a sonnet (order) if they correspond to the tiny Shakespeare sonnet circle. As far as the system is "concerned" however, the typing need only be within the larger system set circle for it to be considered a "sonnet"(order). While the system's standard (of what constitutes order) may be very low in our terms the system's standard does exist and it is held absolutely for the lifetime of the system. Any appearance of "hieroglyphics?" or anything else would require an alteration (disordering) of the system. Any such alteration would end the lifetime of the system and establish a new system, and a new system set.

It is the mingling of two sources of constraint in a single system that causes uncertainty in such finite systems. An analogy can be drawn here between "monkey Shakespeare" and "Poincaré recurrence" in thermodynamics because they are both recurrences due to system finiteness.[3] In both cases, there exists a finite set of available configuration states. While any given finite thermodynamic system may be very complex, so long as it is finite, it will be subject to recurrence. "Monkey shakespeare" and "Poincaré Recurrence" in thermodynamics represent those rare occasions when the basic system order is physically indistinguishable from externally imposed order. Because constraint is a single characteristic, any mixture of constraints in a system will be indistinguishable after the fact. Subsequently one can never be certain, in a finite system, whether any given order is...

A: Order from an external source (William S.) or...

B: Order from the basic system state.

We can now formulate a basic principle (or two)...

#1. The Brookfield uncertainty principle for *finite* thermodynamic systems.

Which states "For any given finite system there shall be uncertainty as to the source of order (A or B) if one has to base one's conclusion solely upon information gleaned **from within that finite system**." The significance of this principle is the isolation of **two** distinct sources of order and the recognition that thermodynamic uncertainty is due to the finiteness of the system itself.

And then we have...

#2. The Brookfield absolute certainty principle for *infinite* thermodynamic systems.

This is the corollary to #1. In an **infinite** system there exists absolute certainty as to the source. There is only one possible source of constraint. In the typing monkey example, as the size of the alphabet increases to infinity [4] the probability of finding "monkey shakespeare" in any given run, decreases exponentially to zero. Absolute certainty is produced here by the absolute absence of the source of uncertainty, **finiteness** (constant system state order). Without the adulteration of the constant system state order there is only **one** possible source of order: **Externally imposed order.**

Now add to that the ...

#3. Proof that the phase space [5] of any universe governed by Einstein's field equations, is infinite.

See Tipler 1979-1980 & Galloway 1984 for proof that the universe is an infinite thermodynamic system. These proofs highlight Hawking's error. Hawking has tried use a **finite** system recurrence "monkey shakespeare" as an analogy for the physical universe -- an **infinite NON**-recurring thermodynamic system.

#4. Combined Implications.

Here we take the "Brookfield absolute certainty principle for infinite thermodynamic systems" #2 and apply it to the universe (an infinite thermodynamic system #3). The combination of #2 and #3 proves that all of the order manifest in the infinite phase space of the physical universe must have a source that is external and not internal. By identifying the source of uncertainty, we have been able to prove with absolute certainty, that the astronomical amount of phase space order [6] in the physical universe must have its source in some kind of astronomical "William Shakespeare." And that it is not the result of "monkey shakespeare" (the constant system state order). Nor can the order be the result of "pure chance"(randomness) because randomness and order are opposites.

Afterward for "Part One"

The original purpose of my 1996 Hawking article was to answer questions posed by atheistic friends of mine -- questions such as "How can an orthodox scientist take ID science seriously?" or "On what scientific basis do you believe in a designer?" In my effort to answer this question, I had identified the source of Poincaré uncertainty and shown it absent in the universe -- and had apparently (re?)[7]confirmed the Cosmological Second Law of Thermodynamics.

Perhaps I should speak more formally to this?

"The physical universe is infinite in phase space volume. It is subsequently devoid of statistical uncertainty. The singular directionality of the statistical Cosmological Second Law is thus confirmed."

I should also perhaps formally re-state my "God proof "in thermodynamic terms.

Because the physical universe is bound by the Cosmological SL, it is able only to produce entropy (disorder), but is unable to arrest entropy production, nor to reverse and thus lower entropy. I conclude, therefore, by virtue of the existence of low entropy, the Physical Incompleteness Theorem and the subsequent scientific existence of "Framework Two."

I hereby proclaim the transcendent "Framework Two," OPEN for scientific examination, analysis and discussion.

For now, however, there are a few "Framework One" matters to which I wish to attend. In particular, I am searching for a cosmic super-law -- a unified GSL.

My analysis in "Part One" had shown the statistical sub-cosmological second law to be uncertifiable. What had damaged the predictive power of the local law was system finiteness -- the system being in a box. This raised the question; If Boltzman's statistical approach had not yielded a comprehensive law, then this left only the box? What about the box? Could the universe be composed of nothing but anti-boxes? And what on earth is an anti-box?

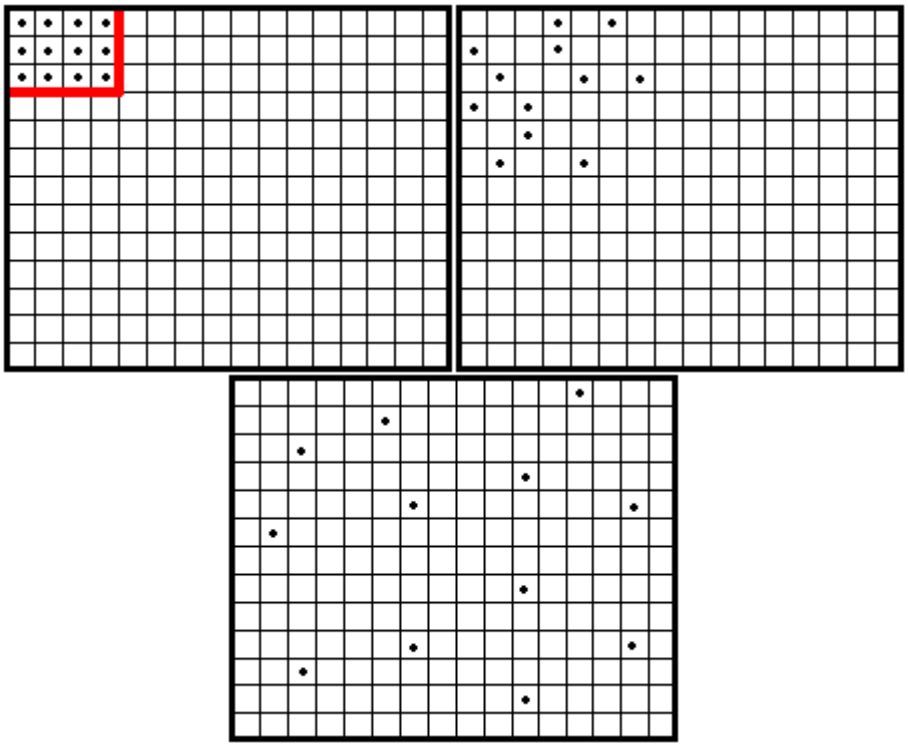
-- Part Two--
A Murphylian Second Look at the Second Law
The Second Law and the Second box

In order to do valid work in science, one needs a set of valid physical laws. If at all possible, this set should include something like the Second Law of Thermodynamics. This law in particular is important because it seems to have no problem with singularities -- reappearing in black holes as The Second Law of Black Hole Dynamics.

Consider however Steven Hawking's [8] comments regarding the classic "Gas in a box" model of thermodynamic motion. In "A Brief History of Time" (Pg. 103 pb.) Steven Hawking states;

"The second law of thermodynamics has a rather different status than that of other laws of science, such as Newton's law of gravity, for example, because it does not hold always, just in the vast majority of cases. The probability of all the gas molecules in a box being found in one half of the box at a later time is many millions of millions to one, but it can happen. "

Fig. 2.
A Typical Time Devolution of the "Gas in a Box" following its release from Box #1.
(Greatly Simplified)



Consider, if you will, Steven Hawking's first sentence...

*"The second law of thermodynamics has a rather different status than that of other laws of science, such as Newton's law of gravity, for example, because it **does not hold always**, just in the vast majority of cases."*

Well, if it is a "law**"** then it must hold always by definition. If it "does not hold always" then it is not a law, period. If it is a "pseudo law" then that is fine for pseudo science, but I am not interested in doing pseudo science. Hawking says that the thermodynamic arrow is reversible because..

"...The probability of all the gas molecules in a box being found in one half of the box at a later time is many millions of millions to one, but it can happen."

The type of event that Hawking is referring to here is known as "Poincaré Recurrence"--named after the French mathematician Henri Poincaré. The result of any such occurrence will indeed reverse the thermal characteristics of the box contents, violating the internal thermodynamic arrow. This internal reversal however will not (in my opinion) reverse the real arrow -- the unrelenting order to disorder movement of the total physical system.

Such obvious inconsistency causes me to believe that Hawking's Second "Law" of Thermodynamics, with its statistical formulation, is not a real law but merely a good approximation to a genuinely real 100% valid physical law.

When ID theorists speak of the Second Law of Thermodynamics my feeling is that they are almost always referring to its design (order) implications -- the real arrow and not its isolated thermal implications. Thus, we really need a name for this new, profound and all powerful cosmic law, lurking just behind the Second "Law" of Thermodynamics.

I had originally been afraid to bring this "new law" idea forward due to the likelihood of its name turning out to be "Brookfield's First Law of Irreversible Cosmic Catastrophe" or equivalent. I then realized, however, to my enormous relief that we already have a possible second name "Murphy's Law."

"Murphy's Law" was named after Air Force engineer Capt. Edward A. Murphy in 1949 who applied it during a G-force testing project. The Air Force doctor and human guinea pig for the military G-force project Dr. John Paul Stapp, said at a press conference that their good safety record was due to a firm belief in Murphy's Law and in the necessity to try to circumvent it.

Thus, we now have two putative laws. The Second "Law" of Thermodynamics which states "*In a closed system, entropy must always increase" "except in reversible systems where it stays the same"(Penrose ENM-1989), or during Poincaré recurrence where it actually goes in reverse(?)"*

This, however is not a law! This is a joke! "It slices, it dices, it goes forwards, it goes backwards." I don't think so.

Luckily we now have Murphy's law that states "*if something can go wrong, it will.*" Or more scientifically "*If left to its own devices, the universe is doomed!*"

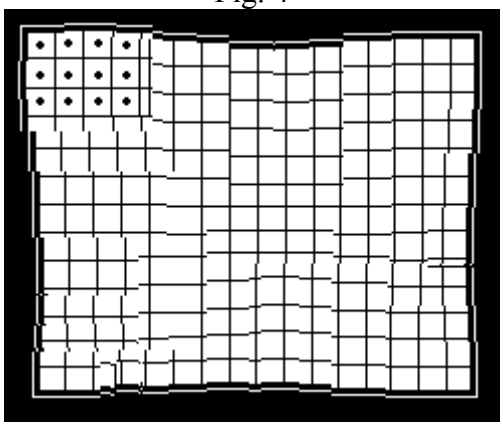
Other Murphylian statements might include;

"The physical universe is on a collision course with itself!"

"The universe's matter is just mindlessly crashing around inside its space!"

Let us now re-examine Hawking's box in the light of our new "Murphylian" knowledge. Now what could possibly go wrong? Well, for starters, during "Poincaré recurrence" there exists an absolute pressure differential between the part of the box that contains no particles (zero pressure) and the part of the box that contains all of the particles (all available pressure concentrated). If this pressure difference (or movement) either damages or destroys the box then this is certainly in keeping with Murphy's Law.

Fig. 4



During "recurrence," the physical box is put in the most uncomfortable situation of being two sizes at once. If the structural damage incurred by this anti-thermal spike is sufficient to keep "Murphy's Arrow" on the "straight and narrow," then Murphy's Law is the more scientific (realistic) of the two. Also, if the physical system in question (the box, the typewriter, the monkey, etc.) has sustained any damage between recurrences then these local "recurrences" are illusory in terms of the system as a whole. Remember the inner walls of the box are constantly being hit by flying particles. During Hawking's (particular type of recurrence) one side of the box is spared, but the other side is hit with double the intensity.

The Poincaré "recurrence" example is not telling us that physical systems can be ordered -- by accident -- by chance -- by randomness (the opposite of order). It is telling us instead that any such internal statistical analyses are incomplete and that such narrow assumptions can only lead us to illogical "order by randomness" "light by darkness" type conclusions.

The orderly box is being constantly assaulted from inside by energized particles at all levels from microscopic to macroscopic. Given enough time, its destruction is inevitable. As long as every configuration state, including Poincaré "recurrence," is doing its equal part to bring about the eventual destruction of the box, then Murphy's Arrow is perfectly straight.

So while the internal system's state **during recurrence** is indeed a violation of "**Maxwellian Distribution"** (in which all particles "should" be spread evenly over the internal system space) it is completely consistent with ***Murphylian Distribution** (in which the system's self-destructive potential (stress) is spread evenly over all of the system's available configuration states).

* *This might also be called "Brookfield Distribution," assuming no-one on the planet has thought of this before.*

For another analogy, consider if you will, a pseudo battle, with the gas doing its best to attain equilibrium, but with the box serving as a barrier to the gas, in attaining that goal. Which "side" is winning? The gas that seeks equilibrium? or the box made of other molecules that also seek equilibrium (but have instead been mined from ground, ripped screaming from their blissful earthly slumber -- melted, smelted, hammered and refined, in utter defiance of the wailing, anguished cries for mercy from their bereaved little mineral brothers{and they call me crazy!?} then forced in into a hideously unnatural box shape by dastardly humans)? The gas is clearly eroding the (all too happy to be eroded) box. The Brookfield/Murphy Law is confirmed.

Actually, I'm just kidding about molecular torture.

So Steven Hawking (and apparently the entire scientific community) have missed out on discovering "Devolution" by mistakenly assuming the following;

#1. An orderly finite box (the universe is not a box{it is an infinite non-recurring system})
#2. A perfectly strong box (no box is perfectly strong).
#3. A perfect "bounce" (no bounce is a perfect bounce).

In the real world, boxes are not perfectly strong, nor perfectly elastic and the physical universe was never a box in the first place.

So, if ones "order to disorder" model of the universe, is that of an order-adulterated gas inside box,

...but the real universe is not a box and its contents are subsequently not thus constrained,

...then such a model cannot accurately represent the universe, nor properly display a cosmic law of order and disorder -- of constraint and absence of constraint.

Similarly, if ones "order to disorder" model of the universe, is that of an order-adulterated gas inside an eternally indestructible box,

...but the real universe contains no such boxes and no contents whatsoever that are thus constrained,

...then such a model cannot accurately represent the universe, nor properly display a cosmic law of order and disorder -- of constraint and absence of constraint.

I believe that it is now time to go beyond the statistical Second "Law" of Thermodynamics as a theoretical tool, leaving it for those who wish to work with, or talk about things like heat or pressure. We then establish, from the implications of the old law, a reality-based fundamental Cosmological Law of order and disorder in physical systems.

The two laws could now be described as;

#1. The old local Second "Law" of Thermodynamics (that "is not always right.")
#2. The **Murphylian Adjusted** "second" Law of Order Dissipation (that is always right).

Both of these laws, seamlessly connect to the Cosmological Second Law that was verified in "Part One." They are both "good" laws in that regard. Law number one however is just not good enough (by my standards).

In "Part Three" I present my conceptual framework for a new "Second Law." While the following is undoubtedly more speculative than parts one and two, I feel that this territory must be covered (analyzed, debated, tested, etc.) if progress is to be made. My intent is to put a contender into the GSL "ball park" so that it can be "kicked around" so to speak. A fully valid, space-time inclusive, local second law is (in my opinion) an essential prerequisite for GSL unification.

-- Part Three --

The Devolving Gas, The Devolving Cosmos

An introduction to Topological Devolution

#1. "During his lifetime, Beethoven spent his time composing. Since his death in 1827 however, he has spent his time decomposing."

#2. "During his lifetime, Beethoven spent his time evolving. Since his death in 1827 however, he has spent his time devolving."

In this article I am suggesting that "decomposing" or "devolving" are functions of the physical world, not directly attributable to Beethoven. I further claim that Beethoven's

ultimate post-mortem devolution is not just an uncertain tendency, but is instead, a physical law. While decomposition is indeed hastened by the activities of other biological organisms, such help is not really needed. When one considers the combined long term effect of rain, wind, heat, cold, fire, floods, volcanoes, earthquakes, asteroid impacts, planetary collisions, stellar collisions, galactic collisions and black holes, etc. the law of devolution becomes apparent.

The initial efforts to unite thermodynamics[A] and black hole dynamics [B] involved applying the formalism of [A] to [B] or the formalism of [B] to [A]. As far as I am aware, all such attempts have been unsuccessful.

What does not seem to work, for instance, is the consideration of relativistic space-time curvature in isolation (i.e., Weyl Curvature{compilation}Hypothesis - Penrose ENM 1989). An infinite "mass" black hole is an extremely suitable (and infinitely probable) GSL equilibrium state, but in such a state Weyl = 0 and not Weyl = ∞ as predicted by WCH.

As previously discussed, local non-relativistic statistical mechanics (orthodox thermodynamics) has not provided a fully valid local law, let alone a black hole dynamic unified GSL. *This does not mean that the underlying Law is bad, for as I have shown, our inability to keep track of a law does not negate it's reality. Its implications therefore must be taken very seriously. The picture may be pixel-ated, but the picture(arrow) is true.*

In order to unite the Second Law Thermodynamics with the Second Law of Black Hole Dynamics what is needed is a "thermodynamic in style" "dissipative" description of the space-time-mass complex -- or of gravity. As we shall see, in Cosmological Topological Devolution, the cosmological force of devolution plays a truly fundamental role -- even more so than that of gravity (space-time curvature).

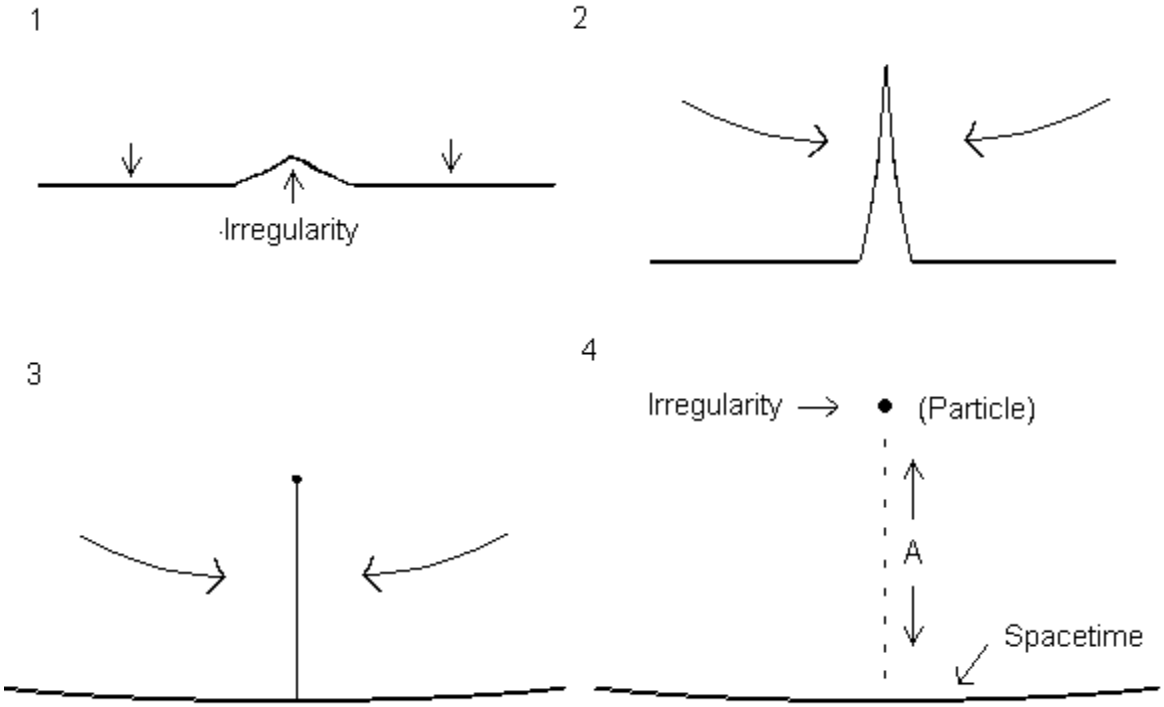
The Story so Far

In Part One, we were able to establish absolute certainty regarding the Second Law's directionality. This was done however at the cost of an explicit statement of uncertainty regarding the thermodynamic arrow in finite systems. In part two I argued for the existence of a fully valid, local arrow, free of uncertainty and a subsequent new fundamental law of physics (to which the Second Law is merely an approximation).

The Second Law of Thermodynamics is derived from the statistical or "built up" properties of the underlying particles in motion. Any meaningful thermodynamic interpretation therefore requires more than just one or two particles. Devolution, by contrast is derived* from the fundamentally irregular, space-time dynamic topology of any given particle. As such it can be modeled in terms of a single particle derived within a comoving space-time field. (In multi-sparticle systems the spacetime component is shared)

**Derived from two assumptions -- the assumption of singular source (Big Bang) and the assumption of a consistent elasticity of the underlying proto-fabric.*

Fig 5



"Sparticle" Physics

When I talk about a "particle" I am referring to that single component of the "sparticle" or "space-time-particle complex" presently recognized by orthodox physics. Gravitational distortion likewise is meaningless without contents to experience and suffer the effects of distortion. What is meaningful, is the entire mass-space-time complex and its topo-dynamics.

In orthodox cosmology, the initial stabilized state of the universe is a one of low entropy particles (primarily hydrogen) surrounded by a pristine spacetime continuum. What Topological Devolution asserts, is that the low entropy (order) of these particles is "paid for" with an irregular (disordered) surface topography. That is to say, low entropy spacetime particles possess a high "entropy-prime" relativistic surface topology.

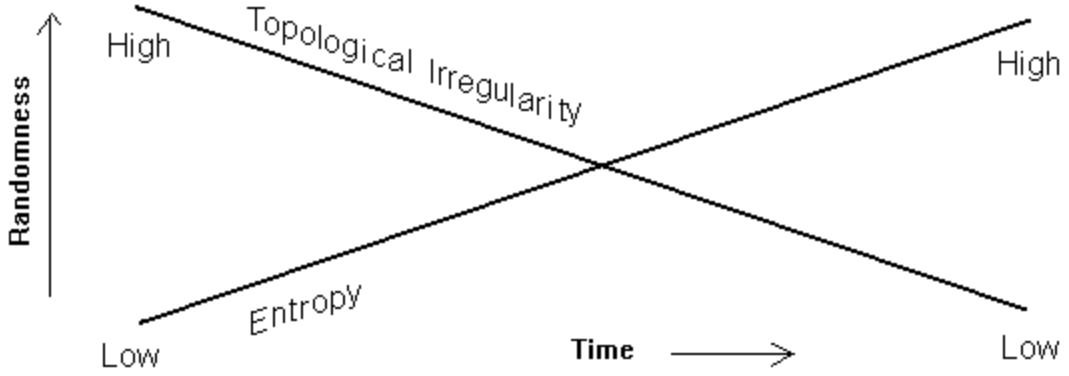
Even the simplest, dimensionality suppressed, TD diagram (Fig #5) contains the two elements that lead to the devolution of the entire universe. These two elements are the surface irregularity and the remnant TD bond that leads to spacetime curvature, gravitational "wells" and "drains." In simplest terms, the TD model is one of "cosmic

sandpaper" possessed with the devolutionary drive (potential energy) to erase itself. In these terms, the particle plays the role of "sand" and space-time plays the role of "paper."

The dotted Line (A) in fig 5. frame # 4 represents the remnant "devolutionary bond" between the particle and its spacetime. This mass-space-time topography is in a "far-from-equilibrium," fundamentally unstable state. This bond represents the fundamental drive of particle and spacetime to reunite. The length is proportional to the amount of topological displacement and represents the devolutionary potential - an energy potential, with the amount of displacement energy proportional presumably(?) to the particle's mass.

Topological Devolution maintains that <u>all</u> physical things by virtue of their very existence as <u>physical</u> things are <u>irregular</u> projections outward from a spacetime background. A bump, a mountain, a wart, a nose, a planet, are all by virtue of their surface extentionality, topologically irregular. When irregular surfaces interact, collide or bounce, slide, etc. surface irregularity is translated into irregular trajectories.

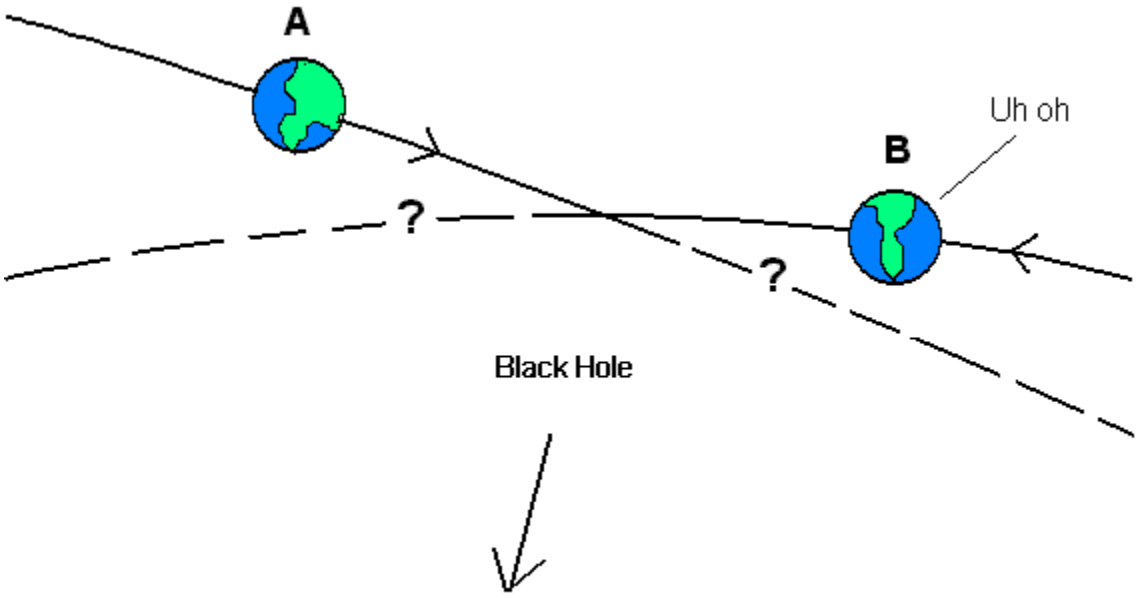
Fig. 6
Thermodynamic Entropy Generation,
is accompanied by..
Topo-dynamic Equilibrium Restoration.



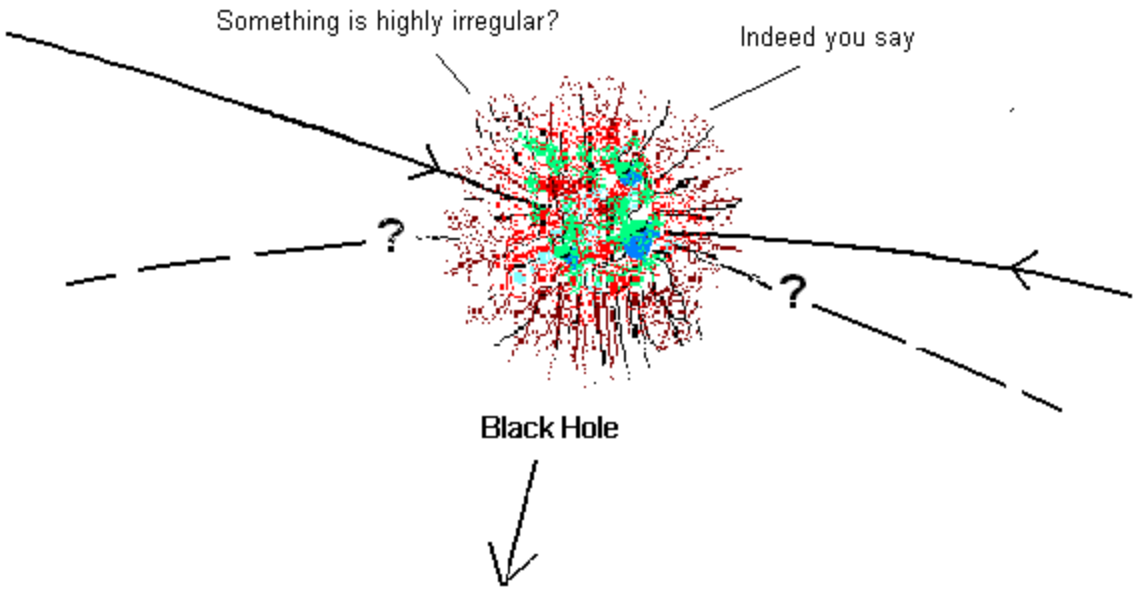
In the standard statistical approach, systems always move toward cosmic equilibrium (an Infinite "Mass" Black Hole (I"M"BH) state) because this state represents an infinitely large target in phase space. In TD, systems always move toward I"M"BH because it is <u>flat</u> and subsequently stable (or, if you wish, because irregularity is unstable). The topological arrow is a mirror image of the cosmological Second Law. TD physics, however, due to its unbroken "sparticulate" nature, forces us to constantly consider the space-time curvature consequences of local physical processes.

A Topological Thermodynamic Process
Planets orbiting a black hole

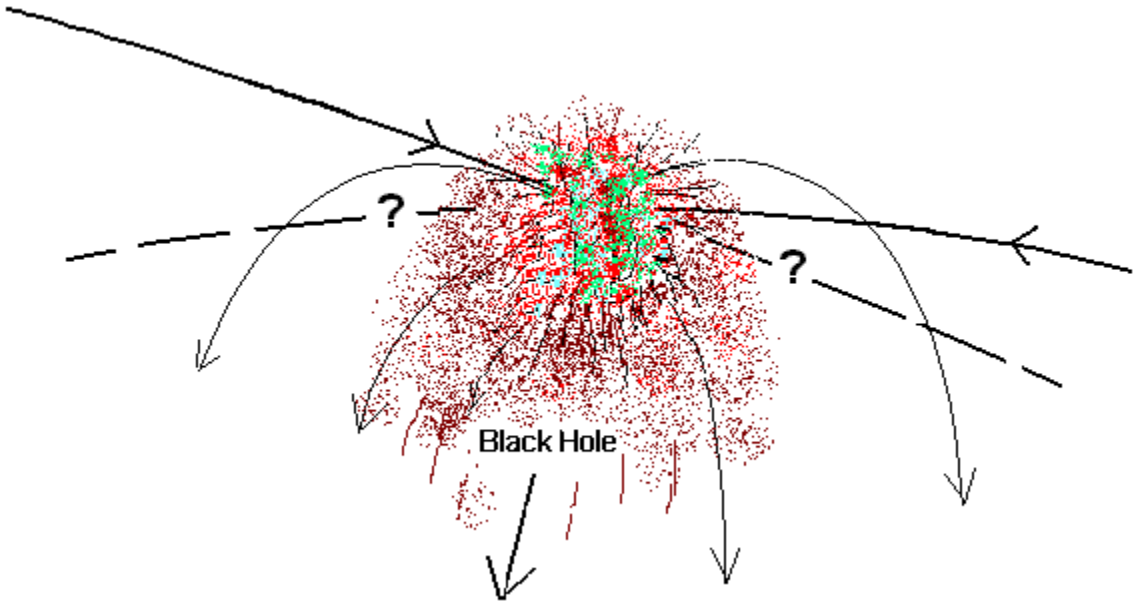
Our sun is orbiting the black hole at the center of our galaxy. We are all, therefore, orbiting a black hole. (One would actually be hard pressed to find some mass in the known physical universe that was not, in some manner, orbiting a black hole or a potential black hole.*)* I believe therefore that this basic model can be applied to the physical cosmos as a whole.



Two planets, in stable orbits, have been thrown off course by a passing star.



Planet "A" has encountered a topological irregularity in space-time. (planet "B")
Planet "B" has encountered a topological irregularity in space-time. (planet "A")



Thermodynamic Physics vs. Topo-dynamic TD Physics

In standard physics, non-random orbital motion is transferred into heat (irregular molecular motion) with an increase in entropy. In TD physics, the orbiting topological irregularity is transferred into heat (irregular molecular motion) with total irregularity being conserved (but with proportional cosmic topological irregularity being lost).

In standard physics, the two planets fall into the black hole in an amount proportional to the loss of orderly orbital motion. (i.e., Hot rocks are not going to stay in orbit just because they are hot). In TD physics the two planets fall into the black hole in an amount proportional to the transference of orbiting topological irregularity(directionality) into non-orbitable irregular molecular motion(omni-directionality). (i.e., Hot rocks, once again, are not going to stay in orbit just because they are hot).

So far, the two branches of physics seem the same, but just labeled differently. What TD physics predicts, however, is that along with hot rocks, etc. (predicted by both TD and standard thermodynamics) there is an accompanying loss of space-time. Some of the energy is lost and is radiating to infinity -- to space-time-mass equilibrium. Much of the remaining mass falls into the black hole and likewise attains mass-space-time equilibrium. There is a significant blurring of this mass due to the enlargement of the black hole's area and a subsequent loss of space-time.

TD physics can at times seem counter intuitive. It is very easy for us to perceive such orbital motion as "orderly." We do not generally see orbiting planetary motion as irregular. Compared to the I "M"BH ground state, however, any motion is irregular. The reason to think topologically is its natural connection to general relativity and common erosion, its conservation of irregularity principle, and its fundamental cosmic symmetry.

Symmetric Yes -- Reversible No.

Even without the planets falling into a black hole it would be impossible to run this scenario in reverse. The reason I believe, is the need to generate anti-friction -- a quantity that does not exist in the known universe. This is the same problem that came up in the last chapter regarding friction and the erosion that flying particles caused to the larger box. In the devolutionary model, friction simultaneously generates space-time devolution due to a reduction of the TD potential. The illusion of time reversible physics stems from the analysis of highly ordered* systems in which friction, spreading and space-time devolution can be safely ignored. Just as friction applies to macroscopic systems, so does topological devolution apply to the elementary particle-space-time system and the cosmos as a whole.

*Ordered only from our particular frame of reference. Just as the planets are in our physical proximity, so is "orderly" orbital motion in our TD-dynamic proximity. The collision causes a sudden shift of TD proximity. With the resulting change of proximity, our Newtonian physics no longer works -- for we can no longer bundle countless individual particle motions, into single Newtonian, physically acting units known as "planets." We can then, for a while however, use another set of bundles "heat, pressure, etc." Were it not for TD proximity and subsequent "bundle-ability," we would all be dumbfounded.

The force of Devolution -- The "force" of Gravity

Gravity is not a force. If Albert Einstein is to be believed, then "gravity is space-time curvature." The moon is not attracted to the earth. The earth is not attracted to the sun. The moon is following what it "thinks" is a straight line. The earth is following what it "thinks" is a straight line.

The heavens cannot be run by gravity -- by a pseudo force, a mere geometric distortion. What is needed is a real force -- the force of devolution. Mass is not attracted to mass. Mass is attracted to its ultimate devolution into the spacetime field.

The reader is cautioned that I have no formal training in general relativity. It may well be that what I am seeing here in "gravity" is only the Weyl curvature tensor component with the "devolutionary force" being the Ricci tensor. If this is the case, then this model represents a reformulation of GR as a dissipative structure -- with the Ricci tensor energy being, very possibly, a direct measure of low entropy and topological irregularity (up to singularity). Beyond singularity, null Ricci mass must be summated.

One of the pre-quantum anomalies of early classical physics was the prediction that particles, with their limited (6) degrees of freedom, would rapidly become spread out into the infinite degrees of freedom of any surrounding field. This inevitability, however, was thought to have been halted (along with the destruction of the physical universe) by the existence of quantum mechanical stable ground states. I here contend that quantum mechanics provides a safety zone, but that is all. Given a sufficient number of localized particles adding up to a sufficient amount of mass, this safety zone can be crossed with

the resulting "devolutionary" reunification of particles with their surrounding spacetime field.

Two Views of a Single Particle's Gravitational Collapse to Black Hole Singularity
Two different(?) routes to equilibrium.

Fig. 6 This view is analogous gas expanding to become the size of space-time.

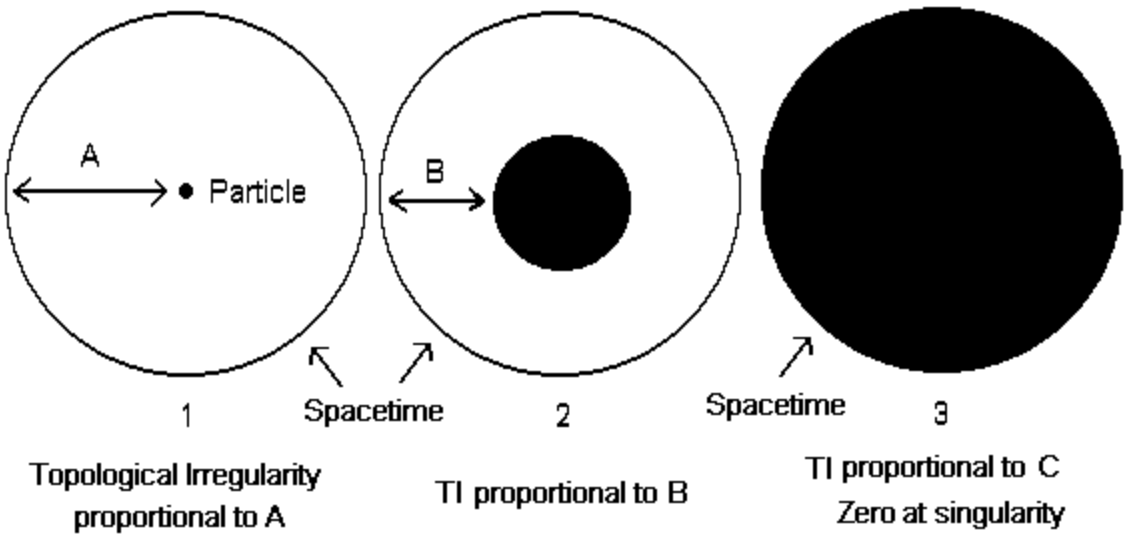
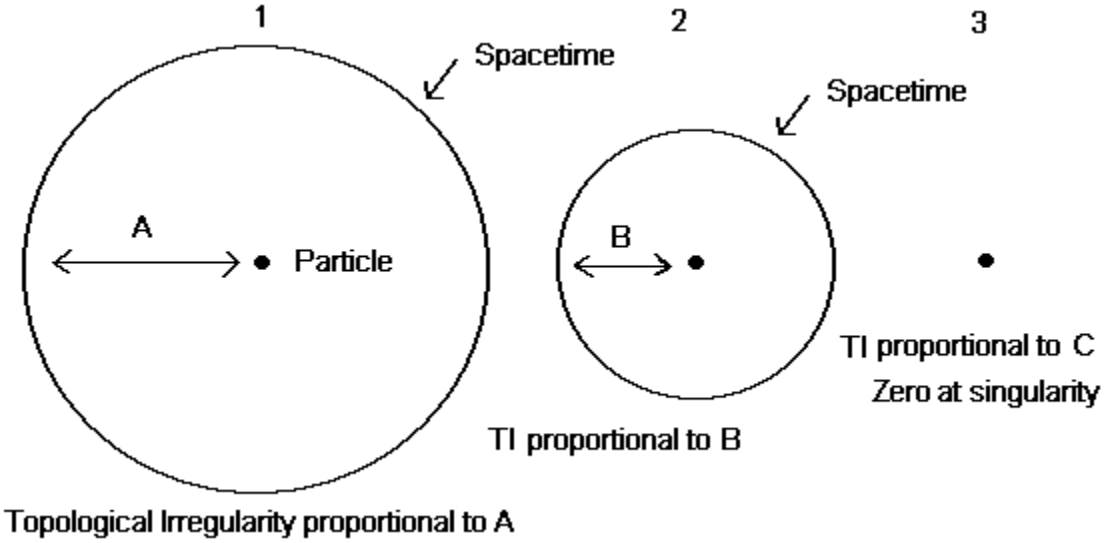


Fig. 7 Space-time collapsing to the size of a particle.



In T. D., a standard gravitational field would be described as a smoothly varying depression of the space-time fabric surrounding a massive object. Particles accelerate toward gravitating bodies because of the partial collapse of the surrounding spacetime's geometric field. Inside such a field, particles become more field-like -- more devolved, relative to the surrounding spacetime field. Particles therefore behave much like middle-

aged stomachs that wish to get out from behind that quantum belt buckle and spread throughout all of spacetime. A standard gravitational field partially reunites the "stomach" with the surrounding spacetime in a combined lower energy/order state. Re-buckling the belt (escape velocity) requires energy/order.

It is the "devolutionary bond" between mass and surrounding spacetime that, when compiled, results in gravitational fields or gravitational "wells." Gravitational wells constantly put things on collision courses and keep them there. The earth's tectonic plates are on a constant collision course. Gravity wells are cosmic "devolutionizers"-- entropy refineries. They are like washing machines gone wrong or household garberators, with the most effective of these being the black hole--a devolutionary drain. In this "washing machine" mass goes in -- and if it ever comes out, it comes out "cleansed" of all irregularity as Hawking's (black body) radiation.

In a black hole, "sparticle" erosion is complete. There is no longer the possibility of a one to one mapping of external to internal information. In a black hole, the "particle" and the surrounding space-time "T.D. field" [9] are at equilibrium -- they are the same point size. Due to spacetime's singularization the normal quantum mechanical protection is circumvented. The sheer flexibility of relativistic spacetime allows mass to perform a limbo underneath the rigid quantum bar. This situation is the combined result of space-time's flexibility and QM's inflexibility. This model predicts that black hole information loss is real.

In a standard black hole, a few specifics do remain (mass, charge, and angular momentum) These specifics however, being coupled to the long range fields, would be subject to any devolution of the long range fields.

As the mass of a black hole increases to infinity, the weight of the black hole goes simultaneously to infinity and to zero (Ricci => 0 Weyl => 0 and Entropy => ∞). Without a coherent space-time framework(order), mass can only pull in all "directions" at once. While the gross mass is infinite, the net mass is zero. Thus the Topological Devolutionary model has a completely smooth and equilibrious ending.

The (topodynamic) universe thus appears as an enormous unraveling clockwork spring, driven by its devolutionary potential to relentlessly burn, spiraling ever downward -- until at last, in infinite black hole death, it is once again reunited with the universal singularity from which it came.

An infinite mass black hole, however, is just an interesting theoretical "object." Its physical existence is not necessary for the law of Cosmological Devolution to be true. What is necessary, I believe, is for black hole information loss to be real.

So, it seems to me that as long as;
#1. particles are irregular surfaces in a spacetime
and,
#2. collisions are certain to occur,

then,
#3. the translation of surface irregularity (entropy prime) into irregularity of motion (standard entropy{and subsequent information loss [10]}) is certain
and
#4. Devolution is a law for all such physical systems.

It also seems to me that as long as;
#1. Black hole information loss is real,
and,
#2. no physical sources of new information exist,
then,
#3. Devolution is a fundamental law for the physical cosmos.

Historical Summary

Initially thermodynamics was performed only with thermometers and other such macroscopic instruments. These instruments measured macroscopic heat and pressure. In the early days, heat was thought to be something like a liquid that flowed from one object to another. Ludwig Boltzman showed how to model this behavior in terms of statistical laws, based upon the statistical kinetic properties of individual particles. Henri Poincaré however correctly pointed out the (seemingly very small) recurrence problem associated with such statistical formulations.

In 1979 General Relativist Frank Tipler showed the universe to be infinite in phase space volume and correctly argued that Poincaré's recurrence problem applied only to finite systems. In 1996 William Brookfield, however, showed (or tried to show) that in such statistical systems, zero probability for one configuration (recurrence) also meant zero probability for any given configuration. Thus, statistically, the universe can neither re-occur, nor occur in the first place.

My conclusion, after all this, was that either that the universe has not occurred -- and it is an illusion (and the Buddhists are right!) Or the universe has occurred, but only with outside help "divine intervention" (the Christians are right!). In order to be as diplomatic as possible to all concerned parties, I have since started using the phrase "physical incompleteness theorem" instead of "God proof."

The Second Law's Formulational Problems

This analysis also points to a problem inherent in any such statistical formulation. In order to be verified, the volume of the system has to be infinite -- but when it is shown to be infinite, it must then attach zero[11] probability to all of its internal (target) configuration states, thereby declaring itself bankrupt of any capacity to "naturally"(by chance[12]) select. But because the 'law' is derived from a sequence of "naturally" selected states, this fundamental assumption must be wrong and the system incomplete. This re-states "The Physical Incompleteness Theorem" and points to a genuine need for a new formulation.

While both the statistical Second Law and "Natural Selection" are problematic natural selection theories, the problem is catastrophic only for Natural Selection and not for the Second law. This is because the Second Law is really a law of descending movement between states and could therefore be better described as a law of natural de-selection.

The Second Law's arrow can actually be derived from the knowledge that "Natural Selection" is impossible. Starting from an initial universe frame [A] (provided by God, consciousness, aliens or whatever) we can then proceed to examine a second frame[B] provided only by chance (Natural Selection). Recognizing that NS is a mathematical impossibility in an infinite universe, the second frame must be a null frame -- an infinitely probable infinite "mass" black hole. The movement from frame [A] to frame [B] represents a significant loss of order and the arrow is thus verified. [13]

"Movement"

In the orthodox Second Law, movement is produced by two separate fundamentals;
#1. The forces of energy and motion (Newton and later Einstein) guided by..
#2. Chance.

Devolutionary movement, however, is produced by only one fundamental -- the devolutionary potential -- the drive(energy) of a split unity to reunite (equalize) with itself.

The reason to take devolution seriously stems from the questions it answers. Questions such as; Why is there an arrow of time? Why do things erode? Why must a physical universe be relativistic? Why does the universe move? Why do the stars shine? Why do black holes act like thermodynamic systems? And why, if orthodox thermodynamics was so good "in the limit" did orthodox thermodynamics fail as a super law?[14] Orthodox thermodynamics failed in this regard due to its systemic failure to provide any connection between "energy" and "chance." (Which in topo-dynamic terms is, "energy" and "release"{...of irregularity in an unbroken elastic medium}).

Second Law - Reformulation - Devolution

Following Boltzman's work, scientists began to notice that the 2nd law of thermodynamics was very much analogous to a law of order and disorder. This law seemed to show that order (low entropy) was continually being lost, while disorder

(entropy) was continually increasing. The second box's ability to impose geometric constraint and "recurrence" led me to the idea of a new, more complete formulation, based not upon statistics, but upon geometric de-constrainers or "anti-boxes." This in turn led to Topological Devolution. Just as the box, temporarily constrains and re-focuses internal trajectories, so do particle collisions de-constrain and spread (disorder) trajectories in their mutual co-moving space-time.

Benefits of Globalization

The story of this article is for me, very much one of "**globalization**." In "Part One" the cosmic arrow was redeemed through **globalization** -- by considering the universe as a whole. In "Part Two" the local arrow was redeemed through **globalization** -- by considering the whole system, including the second box. In part three my solution was sought through **globalization** -- by considering the whole particle and the whole universe including its space-time -- as a "sparticle." For me, spirituality does not mean abandoning rational thought. Spirituality simply means taking the time to look at the big picture.

Topological Devolution

(In Brief)

(Local Devolution)
Local collisions spread local trajectories..

while..

(Photonic Devolution)
Relatively few, high energy photons spread into numerous low energy photons

while..

(Relativistic {Massive} Particle Devolution)
Particles spread relative to spacetime collapse..

while..

(Black hole -- Space-time Devolution)
#1.Black holes combine, summating mass and spreading to consume (unite with) space-time framework
(Assuming an infinite mass universe) or..
#2. Black holes symmetrically radiate all mass to infinity via Hawking radiation.
(Assuming a finite mass universe)

The eventual result, "heat death" occurs in both and therefore all cases

"Space"-"Time"-"Mass" Equilibrium/Reunification
(Here the entire "universe" is exhaustively describable by "Ricci = 0 Weyl = 0."

All other information is lost)

It may seem that, considering my devotion to devolution, that I am convinced the universe is doomed. This however is hardly the case. Devolution is a theory of physics and as such it completely ignores the balancing effect of consciousness. Beethoven (the consciousness), was not considered in TD, only the isolated fate of his physical body, his physical planet and his physical universe. Such conscious consideration will have just to wait for new article..say..

"The Evolving life, The Evolving Cosmos, An introduction to Teleological Evolution?"

-William Brookfield -- Logician - Conceptualist

References

Galloway, Gregory J. 1984 "Splitting Theorems for Spatially Closed Space-Times." *Communications in Mathematical Physics* **96**: 423-29.

Tipler Frank J. 1979 "General Relativity, Thermodynamics and the Poincaré Cycle." Nature: **280** 203-5.

-1980. "General Relativity and the Eternal Return." in *Essays in General Relativity*: A Festschrift for Abraham H. Taub, pp. 21-37. Ed. Frank J. Tipler. New York: Academic Press.

Notes

<1> Yes, I know I could be including capitals, spaces, punctuation, etc. however, as long as the monkey's choices are **finite** my argument stands

<2> Of course I am assuming an idealized "monkey" here, that is truly random

<3> For Rigorous Proof of Poincaré Recurrence Theorem see page 419 of Physics of Immortality - Tipler Frank J- 1994 in the "Appendix for Scientist." Also in this section is "The Finite Markov Chain Recurrence Theorem" page 420, "The Quantum Recurrence Theorem" page 424 and The General Relativistic No-Return theorem on page 427. (As I understand it, the difference between a typing monkey/slot machine type of system and a thermodynamic system is as follows. In a Markov system, selections may jump from target to distant target on a phase space map, whereas in the thermodynamic system, the selections must travel from "A" to "B" through a series of adjacent steps. This difference in allowed motion, however, does not seem to effect the phase space probability map, nor my probability argument).

<4> One way to increase the size of the alphabet to infinity is to simply add an infinite number of hieroglyphics {...X24 Y25 Z26 *27 *28 *29...} to the existing alphabet's 26 letters until the typewriter is infinitely large

<5> For an explanation of thermodynamics and phase space see Penrose 1990 E.N.M

<6> Without the phase space order, the universe would be a black hole singularity

<7> I suspect that Frank Tipler with his relativistic No-Return Theorem 1979 first verified the Cosmic Second Law. Verification of this fundamental law is kept very quiet and does not appear in history books.

<8> It is not my intent to pick on Steven Hawking specifically. Steven Hawking just happens to be a well-known member of the orthodox scientific community whose book I happen to own. Other such descriptions can be found in Penrose ENM 1990 and numerous physics text books.

<9> The Devolutionary (Ricci) tensor goes to zero whereas the secondary Weyl tensor still extends outward from a finite black hole, due to space-time being a shared fabric.

<10> Given the situation of "Gas in the Box" frame number two figure. 2, one can state with some degree of certainty that the gas had its source somewhere in that local region. Given frame number three, however, there is a distinct lack of information regarding the source of the gas.

<11> Due to the mathematical ratio of any finite number to infinity... Zero

<12>Because "chance" is merely "the absence of instructions" or "absence of information" chance cannot "select" anything (except an infinite "mass" black hole -- a "universe" utterly devoid of information). All

claims of "order by chance" are both misleading and delusional. The individual is simply assuming a secondary source of order will be effective in getting the ordering job done.

<13>The reason that our universe is more stable than this, is because it is only a few scientists, on one speck-of-dust planet in the entire universe who are actually taking a holiday from frame production. If every consciousness involved in the ongoing production of the universe, took a holiday, we would indeed have a null frame "universe!" -- At least, that's my opinion.

<14> The orthodox (but Murphylian adjusted) Second Law has not failed as a law, just the opposite is true. It has only failed as a "Cosmic Super Law"-- as both a law and a force. Its statistical formulation has failed to provide a means of going beyond itself to a more unified description of the cosmos.