Hypothesis: Fourth law of thermodynamics

Head Biotech May 2010, Oslo, Norway. Head Biotech Bjørn Sponberg M.Sc.

This theory will probably become the soul of Head Biotech, both in terms of its long term scientific mission and internal ethics. Its importance to Head Biotech is manifested by the usage of the syklohexan molecule in its ground state (Its lowest, and thus most favorable energy state: the *chair conformation*) imbedded in the official company logo:

Head Biotech

Abstract

The theory states that biologic life is thought of by the universe, and is thereby given its own universal law. The laws' formal name is *Fourth law of thermodynamics*. This, since the fate to biologic evolution is suggested to be directly linked to the universes zero-point energy state (Its ground state). Further, the biologic features that lower the universes energy state, during free competition, are *love* and *intelligence* (Termed *positive egoism*). The free competitive-state allows the universes lowest possible energy state to constantly be sought, similar to an apple that falls down from a tree. Free choice is thus simply a prerequisite for the law to work on biologic evolution. The main discovery in this article is to identify *free choice* as nature's endogenous state.

Basically, the hypothesis states that biology's main role is to convert available and potential energy, into positive egoism (Ultimately love and intelligence). Further, that this pattern of conversion, from energy to positive egoism, is guaranteed by the universes desire to reach ground state. Hence the universes ground state is argued to be directly connected to particular features in biologic evolution (Positive egoism). This connectivity is predicted to be most simply expressed in the irreversible reaction Eu→0→Paradise (Both E_p and E_k are extracted). In other words, the drive behind the universes accomplishment of reaching total ground state (Eu=0) is biologic evolution itself, via its constant struggle for safety and comfort (Struggle for paradise as seen by the universe). Part of the math imbedded in Eu=0=Paradise is believed to have already been discovered in the form of the economic Nobel Prize winning

mathematical equilibrium, *governing dynamics (*Also referred to as "Nash equilibrium" or "game theory"*)*. Hence governing dynamics is believed already to have strike a nerve in *Fourth law of thermodynamics*, but without connecting the equilibrium to the universes ground state. What *governing dynamics* add to *Fourth law of thermodynamics* is that it points out that nature do care about moral outcomes in free competition. What *Fourth law of thermodynamics* adds to *governing dynamics* is the effect the universes relative distance to its ground state has on the equilibrium.

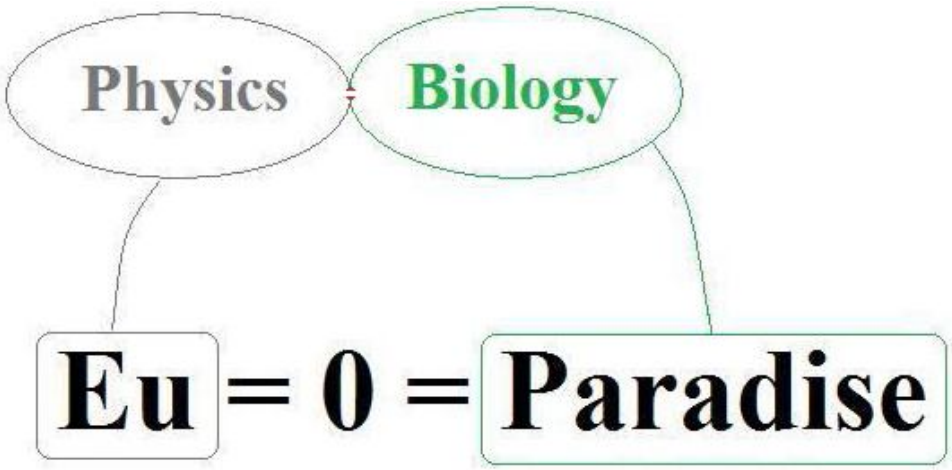

Figure 1. Paradise is a concept that describes the seeking of comfort and safety in biology via egoism (Positive and negative egoism respectively). This theory suggests a universal force to work on biology for the universe to reach its ground state. Dead things sense paradise in another way than biology does but the two worlds are connected. What the two worlds share in common is the favoring of the lowest energy state available. The expression above describes the connectivity between the two worlds and their common goal.

Governing dynamics is believed to describe winning solutions in free competition (Competition for safety and comfort) that lowers the universes energy state. The winning solution(s) in a free game bring to light what we call *intelligence* and *love*, or *positive egoism* – on the whole. Negative egoism (The opposite to love and intelligence) increases the universes energy state, away from ground state, and is thereby given less fitness compared to positive egoism – on the whole. On the whole, *positive egoism* is thereby rewarded with

biologic fitness over *negative* egoism since the universes net force promotes the lowest energy states found.

Static biologic systems, or *closed systems* (Systems with huge governments), are new to biologic evolution. They are not in a free competitive state and are moving out of nature's endogenous state. The suggested evolutionary pathway Eu→0→Paradise is thereby disturbed and can redirect towards Eu→∞→Hell. However, to complete the last pathway would not be possible due to the universes constant desire to reach minimum energy states, and the demand of an external source of unlimited energy supply from outside the universe. Thus, the laws set up in this universe guarantee the Eu→0→Paradise pathway to go to completion over the alternative Eu→∞→Hell. Said in another way, evil sucks up energy - love releases it. Thus, the only place where evil can truly accumulate is in a closed system, since in it - the lowest energy state is not forced to be sought for survival. Hence a natural result of closed systems is the statistical chance of negative egoism being rewarded with comfort and safety over positive egoism to increase (E.g. Nazism & Communism was both based on closed systems).

Further, I also speculate about if biologic evolution is controlled by a pulling effect (As a falling apple is), and thus moves in a predestined route over evolutionary time. Both actions, evolution and gravitational dynamics, are thereby governed by the universes desire to reach ground state. Finally, the modern development of Enterprise Systems is used as a parallel biologic evolutionary system to support some of the ideas presented in Fourth Law of Thermodynamics.

In conclusion, the universes ground state is believed to be shared by physics and biology. As a consequence it is the universe itself that ultimately defines what is *good* (Positive egoism), and what is *evil* (Negative egoism). As argued for in this text, the universe speaks through fruits grown in a free state.

1. What triggered the development of the theory?

1. The first simple question was: Is there a limit to how intelligent one can be? Can biology (Or we) gain 1000 times higher intelligence levels, 9^99999 times higher intelligence levels, or will biologic intelligence levels just continue towards ∞?

The answer was that, yes- it is probably a limit to how intelligent one can be within this universe. This, since it must be a limit to how many things that can be understood due to the constant mass in the universe. Thus, this limit was set to 100%, or can also be referred to as "God".

2. In general one can say that intelligence within biology has grown steadily during evolution. With the recent medical development one can assume that the general rate of intelligence/time produced by nature will change dramatically, and make the earlier rate approximately *linear* in comparison. That is, it will be possible to produce intelligence artificially without going through the traditional evolutionary processes, in the future.
One important question asked was if this idea of producing intelligence was a "sick" development, or was meant to happen from the beginning of time. And if so, how can we know?

A universal law can be seen as the will to the universe or the will of “God” if you like.
The first idea to see this “artificially” production of intelligence, as “natural”, was to draw the story-line of intelligence development over evolution as a curve on a sheet of paper. This top-down graph became similar to top-down graphs illustrating the speed rate to physical objects that were pulled through the universe by the gravitational force towards a predefined goal [1, 2]. The gravitational force is known to be universal and to work over the whole universe. Thus, the idea in figure 3 is that the development in biology can be another dimension of a scenario in which a physical object is pulled towards a predestined goal over great distances in the universe.

In summary; the first framework to a biologic universal law was set by:

1. Setting the potential maximum level of intelligence in the universe to 100%, due to the constant mass in the universe.
2. Isolating *intelligence* as a feature in nature that grew steadily over evolutionary time. It thus seemed that nature wanted this particular feature more than anything else. If so it should not stop growing until 100% of its potential has been reached.

Further, I assumed that God represented the proposed 100% maximum intelligence level, and that it attracted small pockets of intelligence, wherever it was found in the universe.

2. Evolution put into the gravitational formula: F = G Mm/r^2

Let’s say that the exact dynamics that governs evolution has an identical analog situation in the physical world of gravitation.
In this situation the first life forms represent a small amount of mass that are drawn towards a huge amount of mass (the *goal*, or *God*). Their sizes is not very important since the mass

expression in the formula (M*m) will stay constant. However, the illustration will make the comparison easier to imagine since one must assume that it is biology that moves, and not *God*.

In the physical world the forces working on the infinite small amount of mass will be according to Isaac Newton's formula:

$$F = G\,Mm/r^2 \qquad (1)$$

In biology *M* will become *God* and *m* the simplest life form. Initially, *r* will behave as the distance in intelligence between God (M) and the first biologic life form (m). Thus the start position will be infinite distance away from each other, the first life form and God. As time goes by, the biologic life forms will increase in complexity and its intelligence level will rise as biology gets closer to *God*. In the physical world this is seen as when the small stone moves with time, the distance *r* between the great mass and the small mass will decrease. This pattern will continue according to the gravitational formula (1) in both worlds (Physics and biology). The expression over r (M*m) in (1) will stay constant during the whole process. However, at a certain close range to the large mass a dramatic change will take place in the gravitational force, and thus the velocity. The gravitational force will take an extreme exponential form relative to its earlier behavior [1, 2]. According to the theory this is about to happen in the course of biologic evolution on this earth. That is, the increase in intelligence level per time unit will dramatically increase compared to the earlier patterns seen from the first life forms. That is, if the theory is true, biology (Or we) are meant to start producing intelligence (And *love* as described later). Not because *we* are so clever, but because the universe wants this to happen in this time-window on the graph.

In summary; the analogue between the gravitational forces in physics with biology places biology today (2010) at the graph shown in figure 3.

Introduction of negative and positive egoism

According to the theory biology seeks paradise via egoism because the universe wants it to. Egoisms placement into the gravitational formula, would most naturally replace the constant graviton force *G*, which was set by Newton. However, I introduce *positive* and *negative egoism* as two subunits of *Egoism*. These describe the true motivation behind biologic behavior. That is, one can seek paradise (Safety and comfort) via negative or positive

egoism (Evil or good respectively). I suggest that positive egoism will have a stronger attractive force towards the universes goal (Paradise) compared to negative egoism. Hence, I suggest that the constant G force is not so constant, but fluctuates, and is thus instead an average value (See also figure 4). Further, the amount of positive and negative egoisms impact on biologic development correlates with the present energy level in its system. That is, when things become easy, negative egoism is given the chance to exist and vice versa. It is tempting to believe that such a fluctuation between negative and positive egoism over evolutionary time creates a wave function (Figure 4). Such a wave function is also the case with masses that are pulled through the universe by the gravitational force. Since natures energy supplies is deficit (On the whole), it will force the main direction to the path upwards (Figure 3) towards positive egoism. This, because negative egoism demands more energy compared to positive egoism, and must therefore lose to it (On the whole). The opposite can happen in a closed system (The path moves downwards in figure 3) since energy is captured and cannot distribute freely (Not based on free competition). The same danger of developing negative egoism happens to a group in a free system that starts to accumulate energy as well, but this time the energy accumulated is automatically challenged (Due to *Fourth law of thermodynamics*). That is, if negative egoism develops in the group it will immediately affect the group's energy reserves. The group's resources can slip away to a competing group with more positive egoism (Figure 7). This will constantly balance power into hands that eventually will lead the universe to its predestined goal.

In conclusion, to fulfill the whole equation, the gravitational force *F* will symbol *love* and *intelligence*, and will at impact become "100%". Further the *G* constant will symbol what we know as *egoism*, or the motivation that seeks *paradise*. Egoism can take two extreme forms, *positive* and *negative egoism*. The two biologic motivations could create a wave function over time, similarly to what is found in the physical world of gravitation. This could indicate that the *G* constant in the physical world also to fluctuate with time, as hypothesized here. Such a finding in physics could help to prove this approach to *Fourth law of thermodynamics.*

3. Next development: *Governing dynamics* describes biologic fitness mathematically

Paragraph one and two above is the more speculative and also the earliest part of the theory, but it was how the idea begun - connecting biology to the rest of the universe. The equation Eu=0=Paradise came later on from a different philosophic approach, but the two sections of the theory relates. Both approaches involve the biologic seeking aspect, and shares that the

ultimate endpoint in the seeking process is 100% love and intelligences (Their full potential). The logic behind setting the ultimate goal to Paradise is simply that if we care, what created this system must care even more - if the theory is true. That is, it must mean that we have gotten a taste of the paradise concept, and that this vision probably will continue to increase in strength during the evolution that lies ahead of us.

The full potential would be a universe that is filled with 100% love and intelligence - and nothing else. Thus, to prove the connection between the universes energy state and positive/negative egoism in biology today, would be a huge step towards establishing Eu→0→Paradise as a functional universal force.

The Eu=0=Paradise expression compacts the law without the help from drawings (As in figure 3). This time I got help from an already developed mathematical equilibrium (Governing dynamics) that was interpreted into the established philosophic framework mentioned above. What *governing dynamics* does to *Fourth law of thermodynamics* is that it points out that nature do consider moral outcomes in free competition. What *Fourth law of thermodynamics* adds to *governing dynamics* is the effect the universes relative distance to its ground state has on the equilibrium.

Fourth law of thermodynamics could as well have been written Eu=0=God to illustrate the impact point in figure 3, but it would be a static expression. The word "Paradise" better describes the biologic *seeking* aspect that takes place during evolution. But *God* is equal to *paradise*. Biology constantly seeks safety and comfort (Egoism) which ultimately means paradise. In this *seeking* aspect of the equation (The *paradise* expression) is where *governing dynamics* finds its place in free competition. Actually, one could say that governing dynamics constantly works the line in figure 3. This Nobel Prize awarded mathematical system (Rewarded in 1994) is often referred to as “Nash equilibrium”, “Game theory” or *governing dynamics* [3]. It is suspected to have touched upon the law presented here. In that, it is not a coincidence what the outcome is, in a system based on free choice. Economic theory up to this point (1950) was based on Adam Smith’s view that greed in individuals was a “necessary evil”, but which would benefit the common good. Adam Smith described this force as “an invisible hand that led the outcome” [4]. Seen from *Fourth law of thermodynamics*, Nash pointed out that nature do consider “Evil” and “Good” before handing out biologic fitness. The main difference between Smith and Nash is best described in figure 5.

In conclusion, governing dynamics role in *Fourth law of thermodynamics* is to describe biologic fitness mathematically. That is, it describes solutions in free competition that lowers the universes energy state. Further, that these energy lowering solutions demands positive

egoism from biology and is rewarded with biologic fitness. This preset framework of logical pattern is hypothesized to guarantee positive egoism to accumulate in biology over evolutionary time.

The theory predicts the whole universe to be transformed into love and intelligence, or God. Therefore, a short sentence that describes what happens in this world is “God expands”. This, since if the theory is true, only intelligence and love itself could have created this framework for the universe to grow in.

On that speculative note, to use Einstein’s mass–energy equivalence E = mc^2 to describe the outcome if the law is true, would result in a universe full of light (Electromagnetic waves since they have no mass). That is, the only way for E (Eu when describing the whole universe) to become zero in this equation is if m_u (Mass in the universe) disappears from the equation (See also figure 2 under how mass is shown to indirectly produce love and intelligence).

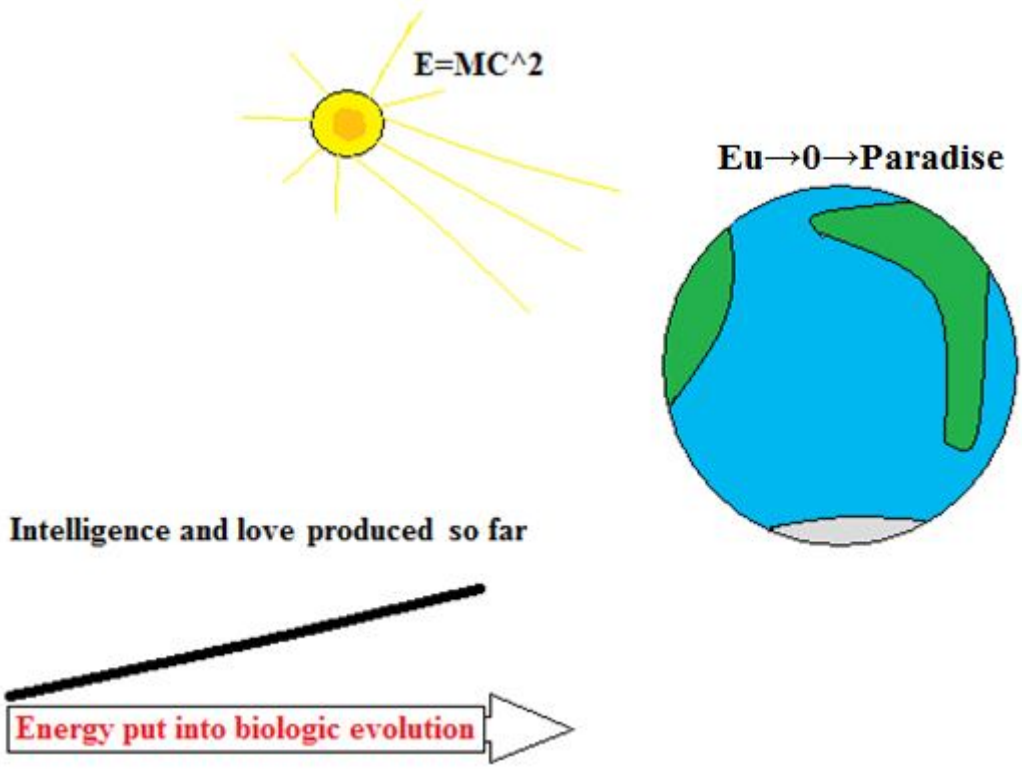

Figure 2. Biology as an energy-converting process with a universal function. The hypothesis predicts that love and intelligence is nature’s desired product. Further that its product is guaranteed via free competition.

Fourth law of thermodynamics states that love will demand less energy compared to hate and are thus favored in the selection process, as a whole.
The "release" of energy saved in a loving group (As seen from the universe) will be transferred to competitive advantage by the universe. To simplify I have divided the difference in motivation into either *positive*, or *negative egoism*. Negative egoism will increase the energy usage level relative to positive egoism.

This law views Nash's work to weld effectiveness and elegant solutions with the biologic features *love* and *intelligence* (Seen from the universe). I think it is best to define *intelligence* as how good one is to orient oneself towards the will of the universe. Thus, *love* can merge with *intelligence* in this case because the universe promotes both (See also figure 3).

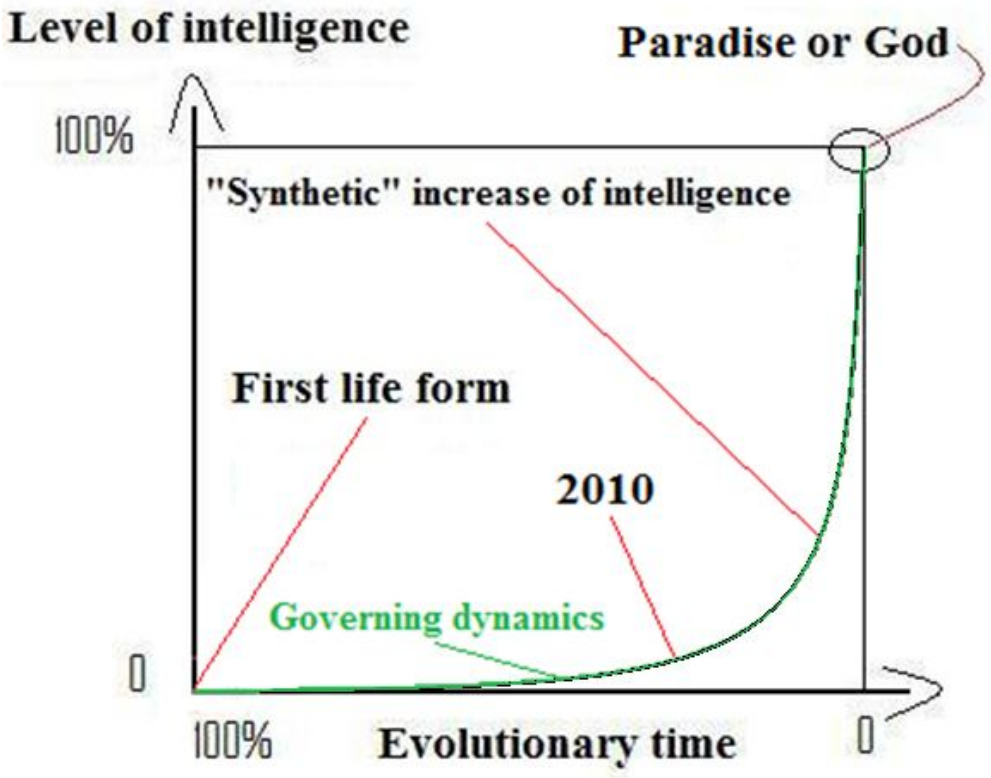

Figure 3. *Love* can be seen as integrated into the feature *intelligence*. Graph illustrates evolution as another dimension of a scenario in which a physical object is pulled towards a predestined goal over great distances in the universe [1, 2].

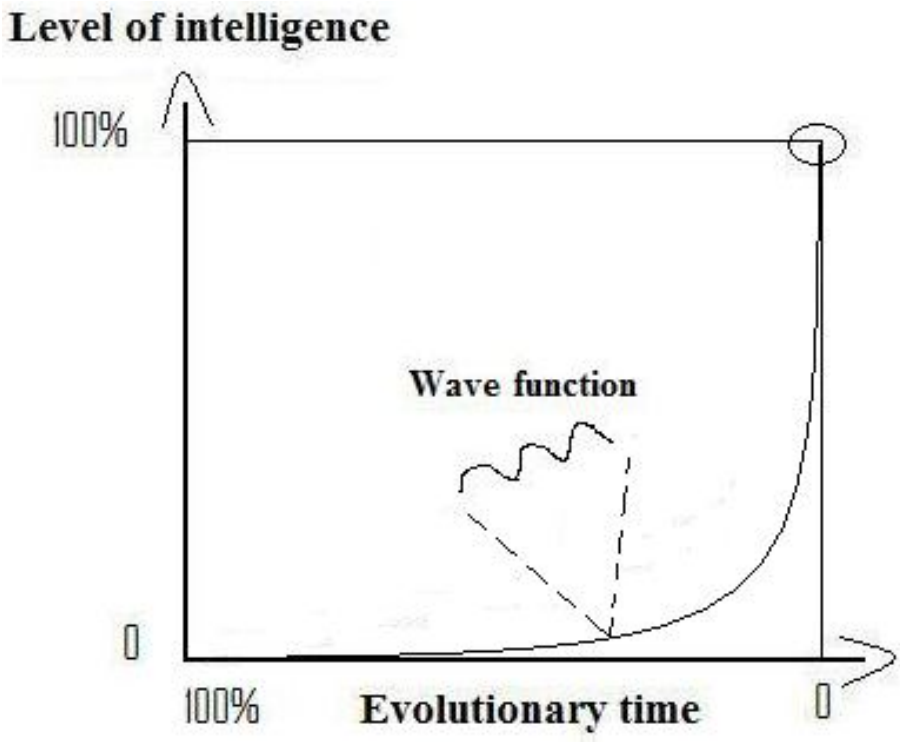

Figure 4. The wave function built in the evolutionary pattern can explain much of the strange observations being done in shorter time windows. For example, how can seemingly evil things gain power if we are drawn towards good? The text suggests fluctuating energy levels. For all real and potential energy states to have been considered during evolutionary time, *free choice* is assumed to be one of nature's endogenous states. The universes constant desire to reach ground state (Its minimum energy state) makes choices that lower the energy state (Available at that time) to be favored (Graph moves upwards). However, this only until much energy is present in the same surroundings. At this point it becomes possible to escape the law for a while (E.g. the possibility to establish static systems). Negative egoism can now develop (Graph moves downwards), but since this direction is not promoted by the total system (The universe) it will gradually become less fit. Thus, at some point small pockets of positive egoism, or within competitive populations, will become fitter and again lead the total development towards the ultimate goal (Graph moves upwards again). This pattern is believed to create a wave function over evolutionary time as shown in the figure. The direction towards negative egoism is given shorter time lengths during evolution, compared to positive egoism, and thus gives the net direction upwards. The analogue to Newtons gravitational force gives the graph its exponential form when it's closing in on its target (See paragraph 2) [1, 2].

If the motivation behind a "choice" does not correlate with one another, it is a *lie* (Figure 6). According to the theory this will result in less fitness because a lie (Conscious or unconscious) results in a waste of energy compared to *truth*. E.g. it will function as a break on effective communication within and among groups, and thus contribute to ineffectiveness in

general. A lie would thus belong in the category *negative egoism*. A biologic system is a result of many individuals. The illustration in figure six can therefore be illustrated on a larger scale in figure 7.

The bigger a closed system becomes the huger arena for negative egoism. Further, the more energy pumped into the closed system the further away from *Fourth law of thermodynamics*, and thus the better condition for negative egoism. The possibility of reaching *Hell* would therefore be in a universe with no free choice combined with an endless amount of energy supply. Consequently, evil in this universe can be seen as a system-error, rather than a human or a biologic error. That is, a closed system can lure out evil that would normally not be there in nature's endogenous state. It is hard to find examples of pure evil to accumulate on a massive scale in free market systems. This from the simple reason, there is no time or money to feed such an activity – it will make them lose power almost immediately. These because nature's endogenous state forces such a system to more intensive consider its energy level for survival (Figure 7). In a closed system, negative egoism can grow due to the captive energy within its isolated system. This will disturb the already established reward system in the Eu→0→Paradise reaction that works in natures endogenous state. That is, safety and comfort can be distributed to negative egoism at a higher frequency than in a free state. Thus, the converting process from energy to positive egoism within biology is not natural in a closed system. The hypothesized result of both systems development over time is illustrated in figures 8 and 9.

A "free" system does not only have to be an economic system, or in a brutal jungle context. For example also religions can be used as an example to project the will to the universe. That is, religions in general are based on founders and followers that looked to the "skies" for truth – and believing in imaginary controllers that were not human (Hope). Thus, religions should have followed the same force, and be rewarded according to their orientations relative to the will of the universe. It is therefore reassuring to notice that all religions have been developed to become based on ground pillars such as moral, love, truth, justice etc. Said in another way, religions have basically become the definition of positive egoism. According to the theory this fact is also why they are.

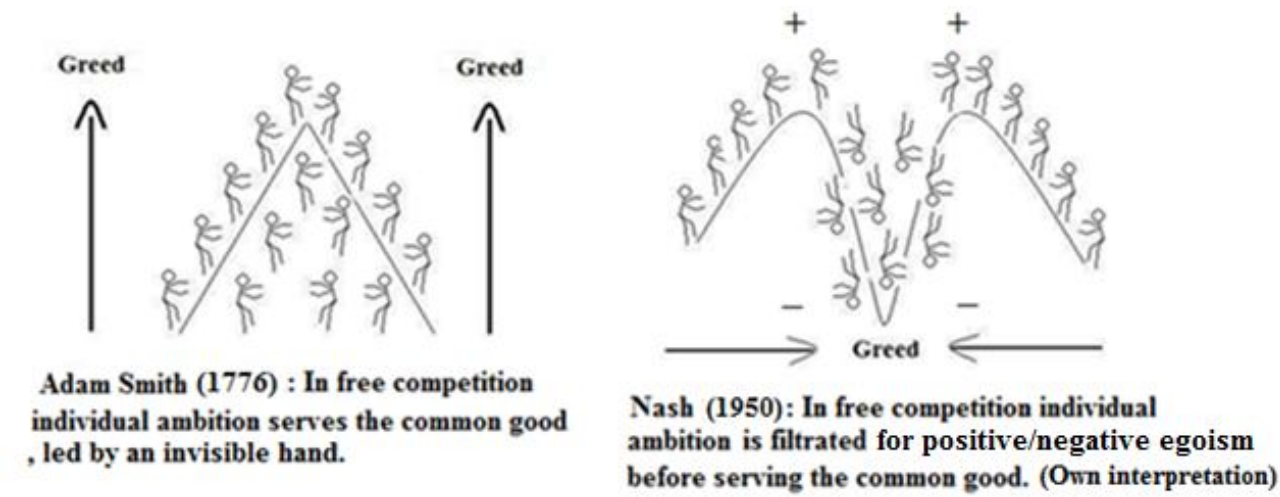

Figure 5. Adam Smith looked upon greed as a necessary evil. Nash pointed out that nature did consider it. Free competition makes power positions potentially available to all (Everyone is allowed to climb).

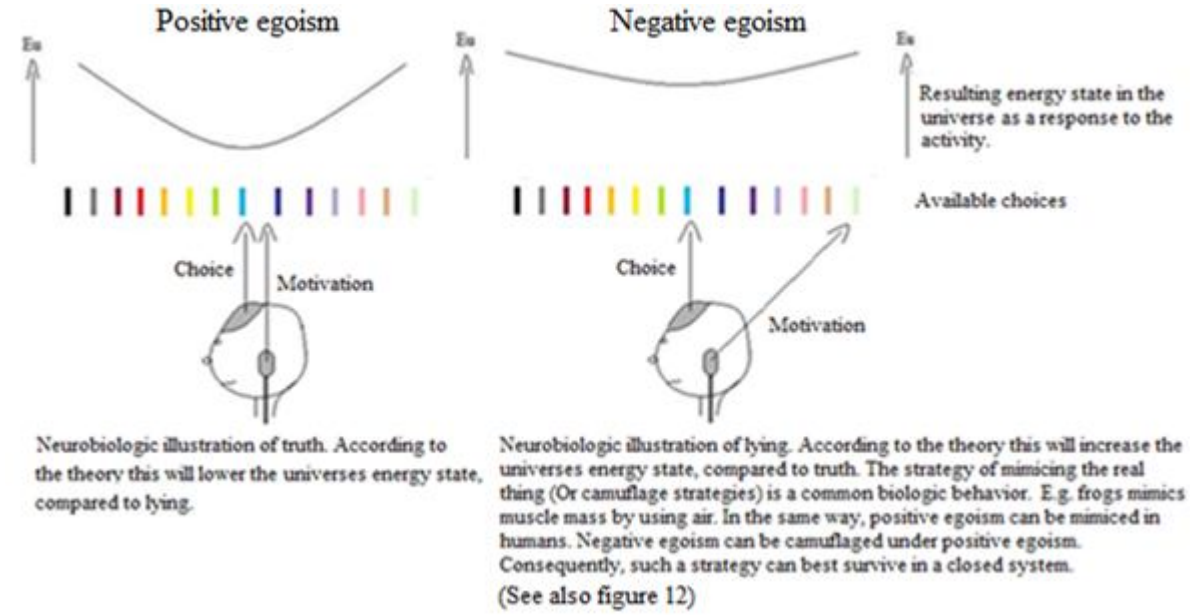

Figure 6. On the human scale *Fourth law of thermodynamics* boils down to molecular mechanisms in the brain when it comes to lying. Basal motivation stems from inner cortex and thus belongs to the unconscious part of the brain. The basal motivations from inner cortex are solved in outer cortex via different strategies such as camouflage. In general, the theory suggests that negative/positive egoism can be identified through universal energy states.

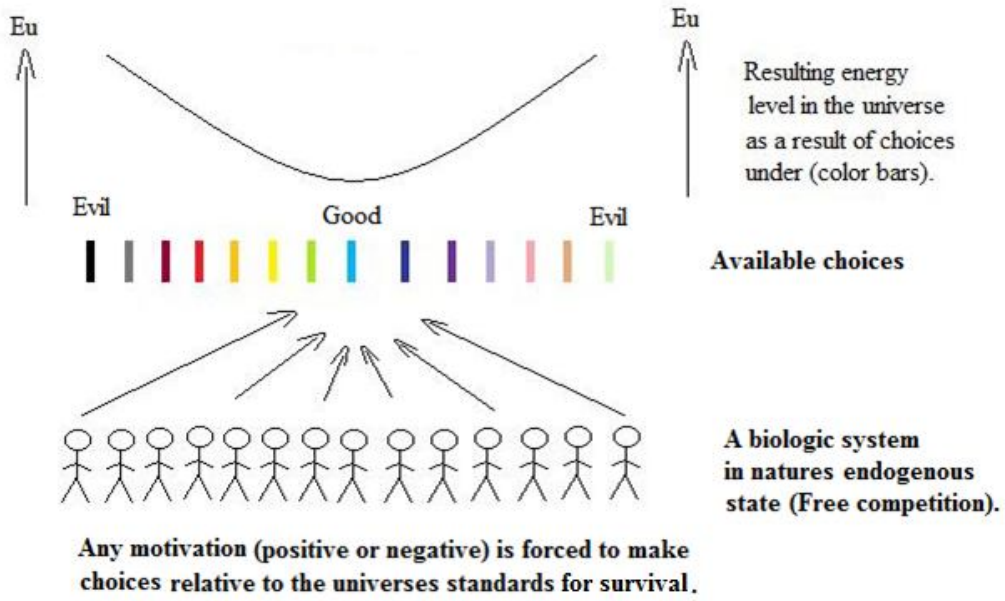

Figure 7. Biology is “forced” to behave well in nature’s endogenous state.

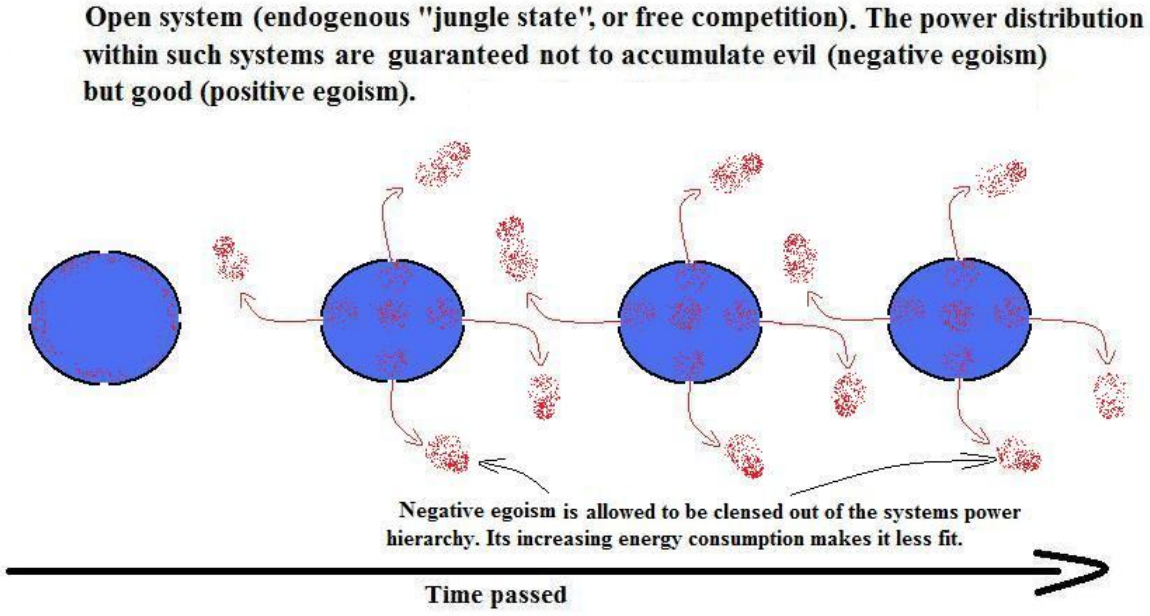

Figure 8. Negative egoism in open free market systems cannot accumulate over time in the systems power hierarchy (Eu→0→Paradise, as in the purposed nature’s endogenous state).

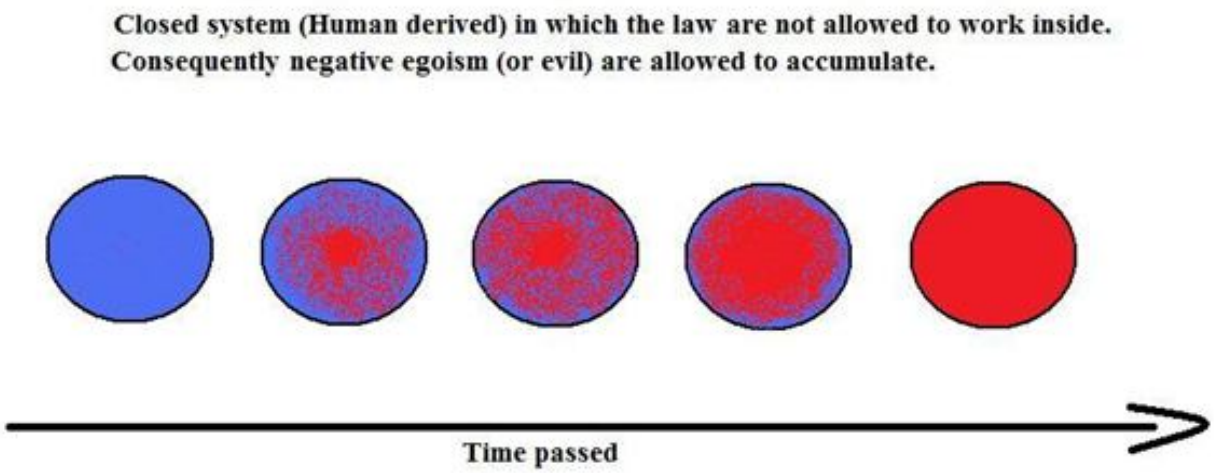

Figure 9. Closed system in which power-distribution is not regulated by free competition. Negative egoism can accumulate over time in the systems power hierarchy.

4. The enterprise system approach

Enterprise information systems and biology share some unique features:

1) Storage of behavioral information in databases.
2) Both systems start evolution with one functional unit.
3) Signaling pathways that connects functional units as the system evolves.
4) Development of event driven architectures.
5) The two systems have both evolved in a free competitive environment.
[6) Both systems have an intelligent supervisor(s).]

Enterprise systems have evolved from a main frame system in the 1960's, to the modern state often phrased as “The digital nervous system”. One question asked is if the two systems could help explain each other. Could it be a fifth, or even a sixth feature that the two systems shares as well? The smaller system (Enterprise system) is probably easier to control and to identify a

feature, or features that are not yet visible in the greater biologic system. E.g. we know that information systems have a supervisor(s) that's main interest is to lower the systems energy by implementing intelligent solutions. That is, to lower the energy state by increasing the intelligence level. It seems natural for us to identify this rather simple pattern of behavior in enterprise systems. Seen through Eu=0=Paradise glasses, the logic energy-state/intelligence-level relationship seen in enterprise systems, could support the view that an intelligent supervisor also runs the biologic system.

Figure 10 on next page illustrates the concept (See also the essay "Biology as a model for enterprise systems" on scribd).

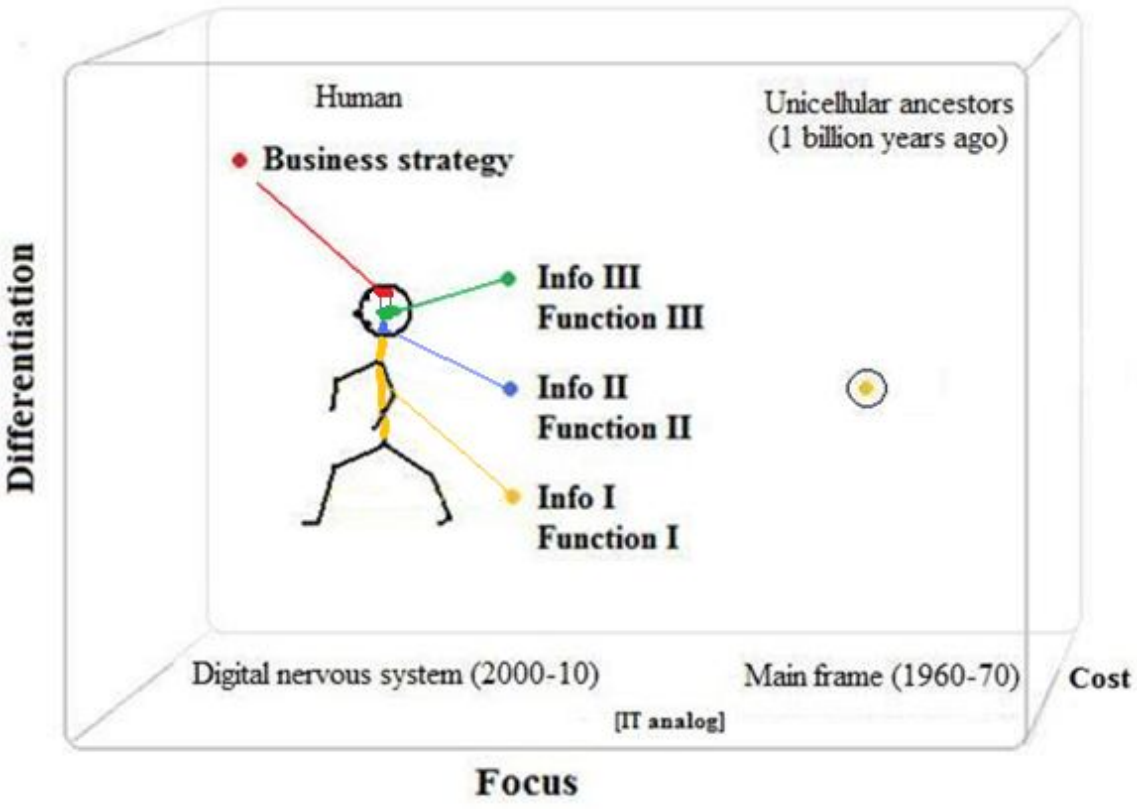

Figure 10. Illustration of two systems that store data and have evolved in free competition. As in enterprise systems, biology also tries to automate "house keeping" functions to gather more resources to strategic thinking and planning. Here put into the competitive framework in Michael Porters book "competitive advantage".

Conclusion

This theory suggests a universal force to work on biology for the universe to reach its ground state. The laws' formal name is *Fourth law of thermodynamics*. The laws function is to accumulate positive egoism in the universe and to correlate with the universes relative distance to its ground state. For all real and potential energy states to have become available for evolutionary judgment during evolutionary time, *free choice* is assumed to be nature's endogenous state. Due to the universes net force pulling towards minimum energy states, statistic probability is what eventually drives biology, and thereby the whole universe, towards the Eu=0 state.

The theory suggests that the universes goal consists of 100% love and 100% intelligence. Further, that in this state there is no energy consumption. Basically, the law states that biologic evolution will not end until energy consumption is superfluous in the universe. This can only happen when the universe reaches its final goal through biologic evolution. When intelligence and love reaches 100% of its potential, the universes goal is reached and no excess energy is needed. The law described in its most compact form is the irreversible reaction Eu→0→Paradise.

Concluding figures 11-13:

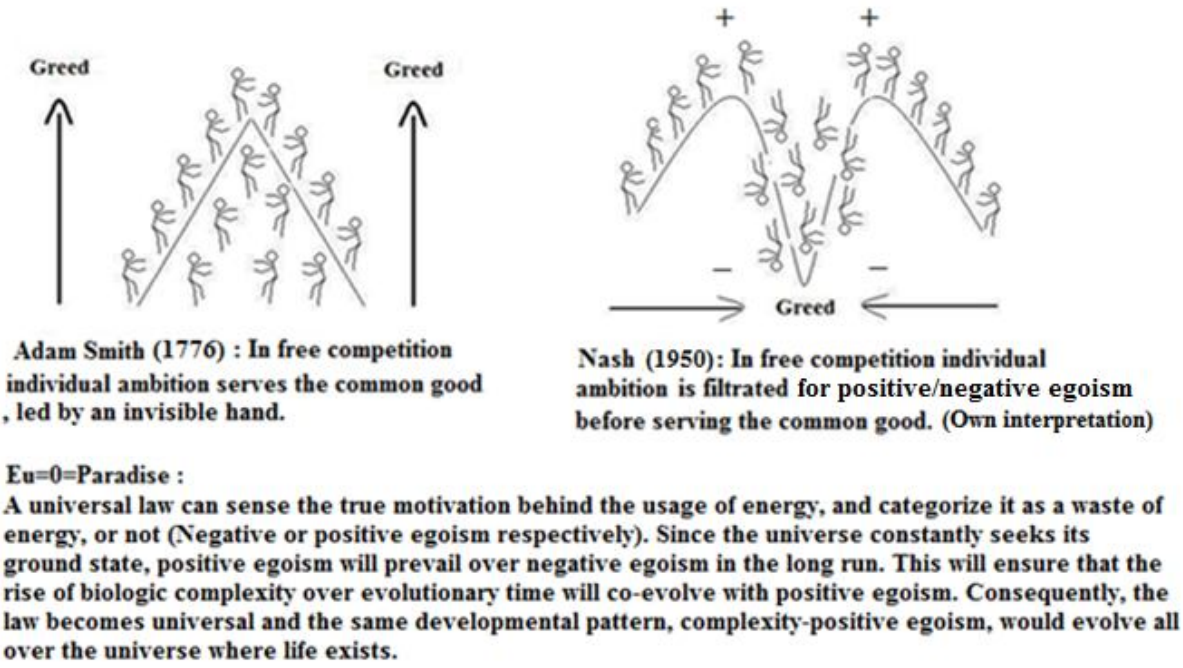

Figure 11. Short summary of the hypothesized *Fourth law of thermodynamics* [3, 4].

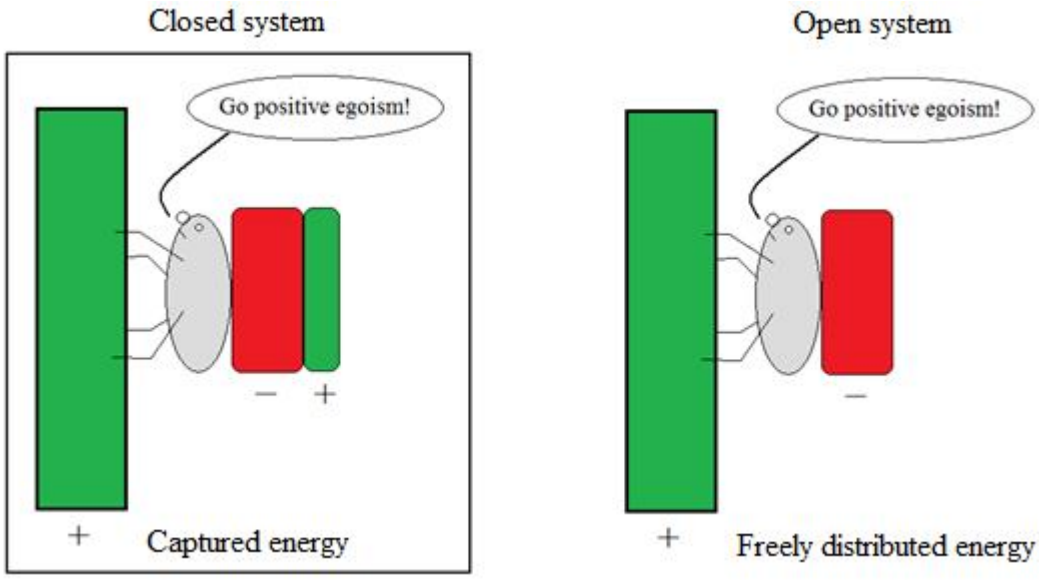

Figure 12. In nature, camouflage (Or lying) is one of the most used strategies for survival. The theory suggests that negative egoism can camouflage under positive egoism in humans, and that this strategy best survives in closed systems, due to the strategies unfavorable energy state.

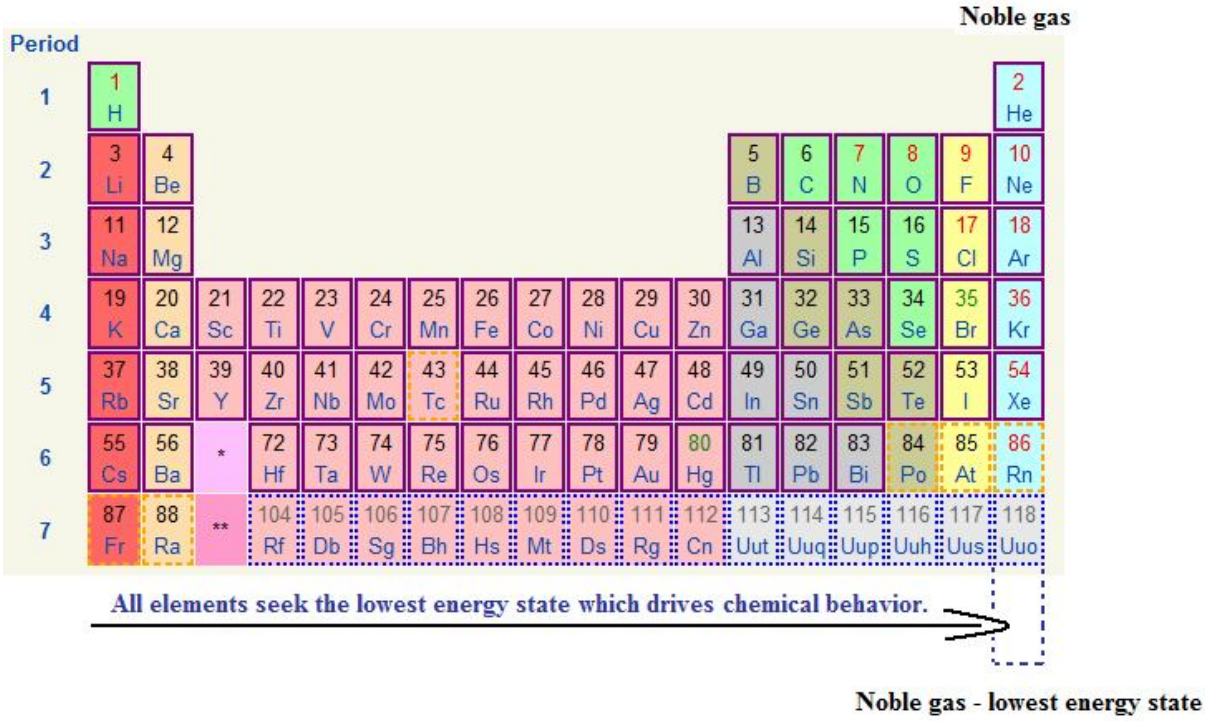

Figure 13. The principle of seeking the lowest energy state is also found among the universes building blocks (Along with gravitation and thermodynamics). All elements seek the noble gas state which drives chemical behavior. *Fourth law of thermodynamics* states that this seeking behavior also takes place in biologic evolution which thereby guarantees positive egoism to accumulate in the universe [Modified from 5].

References:

1. http://imagine.gsfc.nasa.gov/YBA/M31-velocity/gravity.html
2. http://www.nasa.gov/mission_pages/phoenix/images/press/8699_VelocityCurve-r4_001.html'
3. http://en.wikipedia.org/wiki/Nash_equilibrium
4. http://en.wikipedia.org/wiki/The_Wealth_of_Nations
5. http://en.wikipedia.org/wiki/Periodic_table