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Prof. Dr. Arzu AL

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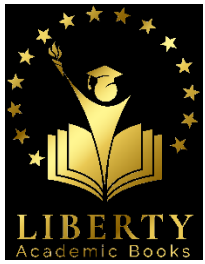

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EDITOR

Prof. Dr. Arzu AL

AUTHORS

Prof. Dr. Arzu AL
Prof. Dr. Wee-Yeap LAU
Prof. Dr. John N. HATZOPOULOS
Prof. Dr. Andrii GRYTSENKO
Prof. Dr. Volodymyr LYPOV
Prof. Dr. Cristina Raluca Gh. POPESCU
Prof. Dr. Afaq AHMAD
Prof. Dr. Adrian IOANA
Prof. Dr. Augustin SEMENESCU
Prof. Dr. Massimo POLLIFRONI
Prof. Dr. Khursheed ALAM
Asst. Prof. Dr. Li ZENG
Asst. Prof. Dr. Khalid Muhammad MUNIB
Asst. Prof. Dr. Basant KUMAR
Asst. Prof. Dr. Mohamed Sirajudeen YOOSUF
Asst. Prof. Dr. Ileana Mariana MATES
Lect. Rajeev RAJENDRAN
Lect. Maha Al BALUSHİ
Ionela Luminita CANUTA BUCUROIU
Elife Beyza KAPLAN

CHAPTER 4

SCIENCE-BASED ETHICS ON GLOBAL ENERGY MANAGEMENT

[1]Prof. Dr. John N. HATZOPOULOS

[1] University of the Aegean, Greece, ihatz@aegean.gr, 0000-0002-8619-9932

INTRODUCTION

The energy issue at a local and global level is related to public demands for a quality of life (Hatzopoulos J. N., 2023), either directly, such as home gas and electricity, or car transportation, or indirectly, as used by the industry to develop products for public consumption. Therefore, to support democracy, the public must have the first word on energy matters in a bottom-up approach. This does not happen, and a few individuals who are considered elite (The Guardian 2006, Muhammad Yunus, 2017) are the ones who manage energy matters in a top-down approach, attempting to increase their profits. Either approach could work perfectly right if guided by proper ethical rules that establish a balance between the price paid by the consumer and the profits made by the elite. Such rules exist and vary in bias among different community groups, often leading to conflicts and fighting among them, which in turn allows the elite to maximize their profits. Most elite methods on significant issues, such as energy, are based on the divide-and-conquer strategy, which they achieve by manipulating public opinion (Dr. Chiva Ayyadurai, 2025) in a way that different public groups have opposing ethical biases on specific ideological or religious issues, causing them to turn against each other. Examining global energy sources reveals that conflicts and wars are prevalent almost everywhere. If people are united, they can have more active participation in local and international issues that support the quality of life (Hatzopoulos J. N., 2023). Science-based ethics is a solution to this problem because science provides solutions with minimal bias, which have wider acceptance, and all related questions are concluded through a well-documented scientific debate involving participants from all interested sides. In addition, science can continually update itself over time through the integration of theoretical and technological advancements. Therefore, people need to be united through proper education to minimize their biases and to understand universal values and ethics that help them avoid being lured by the bait of fabricated ideologies and religions that turn them against one another. For this reason, we will develop two models of ethical value development: One, called internal balance, concerns the human mind and its functioning state, as developed by Plato (The Republic), and the other, called external balance, concerns human error, based on the concept of virtue, as developed by Aristotle (The Nikomachaean Ethics). Consequently, considering human beings as the unit for the bottom-up approach, we attempt

to use these two models to derive science-based ethics that educate people to minimize bias and unite them in facing global issues, such as energy. Furthermore, we will explain what education is and what its opposite, anti-education, is that the elite is pursuing. Finally, we will use the system's approach to evaluate top-down and bottom-up approaches, as well as internal and external balance.

1. SCIENCE BASED ETHICS

Ethics generally deal with issues of what is correct, what is error, what is good, and what is wrong (Britanica). In the present study, we raised an ethical question about which approach is better for managing energy issues: the bottom-up approach or the top-down approach? To answer this question, we stated in the Introduction that we are looking for proper ethical rules that establish a balance between the price paid by the consumer and the profits made by the elite.

Therefore, balance is the most critical rule in Nature that contains all other rules regarding the healthy function of most objects in Nature, including human beings. The principle of balance can be scientifically expressed through mathematical equations, and in fact, most scientific analyses are based on equations. We also have to realize that it is not accidental that Themis, the Goddes of justice, being blind, holds a balance to identify the guilty one who disturbs the balance and does the punishment with the sword (see Fig.1).

Fig. 1. Themis the Goddes of justice.

We have to realize that there are laws and rules in Nature, the Laws being mandatory and the rules having tolerance limits and exceptions (Hatzopoulos, 2022). If someone declares that he does not recognize the gravity law and falls on a cliff, he will suffer directly the consequences.

On the other hand, the rule of balance applies to the Earth's orbit around the Sun as a balance of two forces: one attractive due to gravity, one repulsive due to the rotation around the Sun. The orbit is maintained within tolerance limits but never being the same. The rule of balance applies to the health conditions of the human body, such as stomach acid levels, heartbeats, and blood pressure; all of these must be within tolerance limits, except in extreme situations, like the heartbeats of athletes. We must also realize that there is a reason that rules have tolerance limits and exceptions to permit diversity and evolution of objects in Nature.

Ancient Greek philosophers made such observations on Natural rules to develop universally accepted values with minimal bias. All such values are based on two scientifically defined ethical models. The one created by Plato considers the human soul to be composed of three parts: logic, desire, and anger. We assume, in this study, the soul to be the human mind. Therefore, the human mind is composed of those three parts. Plato considers a healthy mind or an educated person to be one in which logic is in charge and balances desire and anger (The Republic). The effort of a person to maintain this mind condition, which we call internal balance, defines education. Internal balance, as a scientifically developed ethical tool, helps us identify those who disrupt the internal balance, the guilty ones.

The second model developed by Aristotle concerns the human actions defining human behavior. Such actions shall not be deficit or excessive but must follow the mid-space of virtue (The Nikomachaean Ethics). Aristotle's example of the mid-space of virtue is about courage, as a virtue must be located in a mid-space between cowardice and recklessness. A cowardly action is a deficit, and a reckless action is excess. The effort of a person to act within the mid-space of virtue defines the virtuous, and we call it external balance. External balance, as a scientifically developed ethical tool, helps us identify the acceptably correct human action. Based on this concept, we can model human error, where if the error of a human action falls within the mid-space of virtue limits, the action is considered acceptably correct. If it is outside such limits, the action is

considered wrong. Defining the mid-space of virtue limits requires a broader consensus obtained through democratic procedures (Hatzopoulos 2004, 2009, 2014).

Internal balance can be illustrated using Plato's example, as shown in Fig. 2 (Phaedron), where desire is a blind horse, anger is a crazy horse, and logic is the coachman who tries to guide the horses toward the virtuous direction. Suppose we want to express internal balance with mathematics.

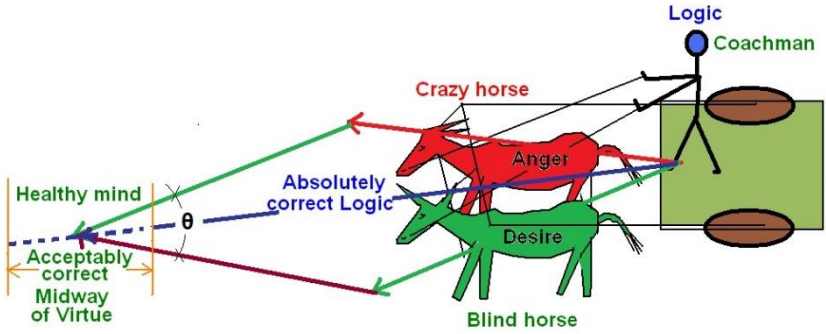

Fig. 2. Illustration of internal balance. Source: Plato, Phaedron, Hatzopoulos, 2009.

Plato's example (see Fig.2) tells us that it is a vector addition of two forces, one being the desire, the other the anger, and the sum of them the logic. We may add graphically such forces as shown in Fig. 2 or analytically using Equation 1 (Hatzopoulos, 2014):

$$L_B^2 = D^2 + A^2 + D \cdot A \cdot \cos(\theta) \qquad (1)$$

Where LB is the balancing Logic, D is Desire, and A is Anger, θ is the angle between these two forces.

Furthermore, we consider the mind space as a three-dimensional space with axes of desire (D), anger (A), and logic (L), as shown in Fig. 3. Notice that L is the current logic, and LB is the balancing logic. This coordinate system, whether it is rectangular or not, is to be defined by further research. We assume here that it is rectangular.

Regarding Fig 2, a current mind state MS is mathematically expressed by three coordinates MS(D, A, L). Forces D and L define the balancing logic LB from Equation 2 (Hatzopoulos, 2014):

$$L_B^2 = D^2 + A^2 + D \cdot A \cdot \cos(\theta) \quad (1)$$

Then, human error EH can be calculated from Equation 3:

$$E_H = L - L_B \quad (3)$$

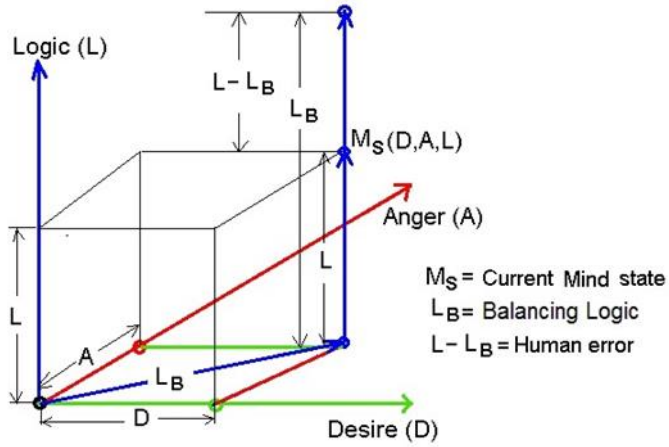

Fig. 3. The mind space. (Hatzopoulos, 2014)

Notice that quantities L, D, A, LB, EH can be quantized, and if they are measured in different units, they can be normalized (Hatzopoulos J. N., N. J., Hatzopoulos, 2024, p.81) to be dimensionless and compatible. The meaning of Equation 3 is to indicate whether or not the Logic mind component is in charge of the mind and how far away it is from being in charge. It is also an indication that the person is educated or not.

External balance can be illustrated in Fig. 4, where a person without physical limitations walks in a street of flat terrain and meets an obstacle that is necessary to raise the foot to pass over the obstacle. There is an "optimum" or perfect height to raise the foot, i.e., the average of all possible correct attempts (optimum correct).

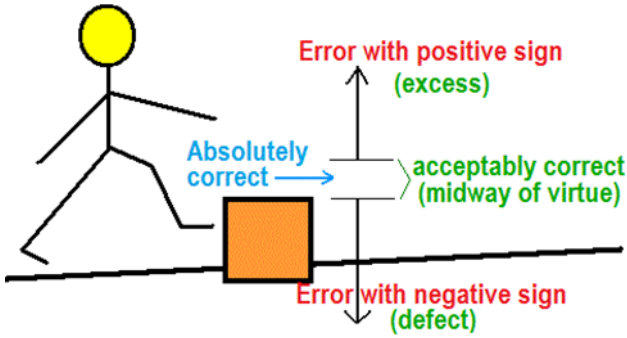

Fig. 4. Human error as defined by Aristotle's mid-space of virtue. (Hatzopoulos 2004, 2009, 2014).

However, raising the foot a little higher or a little lower from the optimum height, the action is considered to be acceptably correct because, in this range, there is no false step. If the height of the foot is lower than the obstacle height, then there is a false step, and the action may be considered an error with a negative sign. If the height of the foot is much higher than the obstacle height, then there is a false step, and the action may be considered an error with a positive sign. The mid-space, which is regarded as correct, is the error variance of the neuron structure (Hatzopoulos, 2014) responsible for raising the foot, and it is pretty similar to the mid-space of virtue as defined by Aristotle.

Therefore, one may observe the following:

(a) The boundaries of wrong and right are pretty straightforward and can be precisely defined.

(b) The function of a neuron network structure responsible for raising the foot has the following characteristics:

a. A nontrained neuron structure (for example, a little kid) the first time that tries to pass the obstacle is likely to have a false step.

b. The next time that it tries to pass the obstacle, it is going to have a better performance, which means that the neuron-based structure can be trained to improve its performance at any desirable level as approaching the optimum.

(c) In the same action, wrong and right (error and correct) coexist, and their boundaries are located at a point where the error value is below a threshold limit.

(d) Correct and error are quantities inverse proportional to each other, which means that in action with a high error value, the correct value is low. In action with a low error value, the correct value is high.

(e) Within the mid-space, there are many options on the way to pass the obstacle correctly, and we may say we have infinite alternatives or, using statistical terms, infinite degrees of freedom.

(f) Freedom may be defined as the alternatives a person has to complete a correct action within well-defined error limits.

(g) Since the magnitude of the error varies from a temporary loss of balance and return to the proper position to a serious injury, then error values may be within the range from zero to minus infinity and from zero to plus infinity.

(i) Bias or deception may be defined if a person knows how to pass the obstacle and on purpose is having a false step.

(j) A nontrained person may be defined as a person who has no physical or other limitations and has a false step in passing the obstacle.

(k) Regarding external balance, an error with a negative sign means a deficient action, an error with a positive sign means an excessive action, and if such error is within the mid-space of virtue limits, the action is accepted as correct or virtuous.

2. EDUCATION AND ANTI-EDUCATION

For most people, education involves acquiring knowledge through memorization and developing specific skills through training, often without giving critical thinking much attention. As we will discuss next, education is something different and has to do with internal balance. We mentioned earlier that an educated person should strive to possess efficient logic, which should be in charge of managing desire and anger. Or to exercise check and balance over desire and anger. Notice that desire and anger are necessary to survive and to perpetuate the species.

Additionally, various emotions, such as joy, happiness, sadness, distress, and fear, depend on the state of desire and anger.

To better understand education, let us consider the opposite of education, or anti-education, where desire and/or anger are in control of the mind and logic is used to achieve their goals.

Unfortunately, such goals have been primarily driven by economic and political power. Furthermore, whoever controls the energy sources can have such economic and political power.

On the other hand, the accumulation of economic power beyond a specific limit does not improve the quality of a person's life; it has no reason to do it, or it does it because logic is not in charge of the mind of that person. The most significant problem arises when a few accumulate wealth from the existing resources, while most of the rest lack the essential things to survive, and they are treated as enslaved people. Therefore, the accumulation of wealth beyond a specific limit deteriorates the quality of life and creates a fear of losing such wealth due to the uprising of enslaved people and, most importantly, because of the rule in Nature that disturbing the balance activates the sward of the goddess of justice (see Fig. 1) and leads to conviction and punishment.

Anti-education was first introduced by Friedrich Nietzsche in 1872. Although he read Plato's books, he, like most people, did not understand the fundamental basis of education, such as internal balance, and instead explained a limited aspect of the anti-education system in a more complicated manner.

We must emphasize that desire and anger are present in most animals, and they are, as we said earlier, essential for animals and humans to survive and reproduce their species. Therefore, the animals, although they have in charge in their mind desire and anger, do not have the logic to support mind decisions that exceed the limits and create, for example, bombs for self-destruction like humans do. All kinds of destruction and self-destruction in humans stem from the promoted anti-education system, where desire and anger dominate the mind and utilize logic to increase destructive power infinitely.

Usually, entieducation also disturbs the external balance, and people do not care about limits because they are not educated to understand what is deficient or excessive action and what the consequences would be of going against the harmony of the rules in Nature by disturbing the external balance.

As explained in Section 2 and regarding Fig. 4, modeling human error would help to create science-based ethics for defining:

(a) Freedom as the alternative actions within the limits of the mid-space of virtue.

(b) Democratic procedures as those that determine the limits of the mid-space of virtue.

(c) Bias and deception.

(d) An inverse proportional relation between right and wrong that coexists in any human action.

External balance could also contribute to a more effective system of justice and a more efficient legislative system. The problem with such systems is that those few with economic and political power influence the legislative process to serve their interests and employ a top-down approach to control and manage the rest of the population, thereby increasing and protecting their profits.

Regarding the functional relation of correct and error, let us assume that X is the error and Y is the correct. The simplest inverse proportional functional relation among them could be:

$$X = 1/Y \tag{4}$$

We can visualize the relationship between correct and error represented by Equation 4, as shown in Fig. 5. The human error is defined along the X-axis, which is expanded from minus infinity to plus infinity. The correct or virtue is defined along the Y-axis, which is also extended from minus infinity to plus infinity. The values on the Y-axis are considered absolute values, regardless of whether they are positive or negative. According to Aristotle, in the mid-space of virtue, there must be two points (upper and lower limit) along the X-axis to indicate this region. Let us define these points as XL and XR, as shown in Fig. 5. Assuming ξ being a positive threshold value $\xi>0$, then:

$$X_L = -\xi \, , \, X_R = +\xi$$

Therefore, the midway of virtue or the area of "acceptably correct" is defined between $-\xi$ and $+\xi$, as follows:

$$-\xi \leq X \geq +\xi, \text{ or } X_L \leq X \geq X_R \tag{5}$$

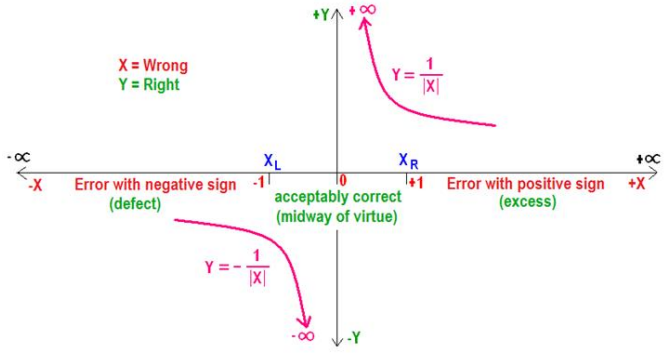

Figure 5. A visual representation of Equation 4. (Hatzopoulos, 2014, 2022)

It is essential to understand that we consider acceptably or correct the region in the X-axis defined by Relation (5). We assume wrong or error all other locations of the X-axis. All locations in the X-axis contain error, but because in the region defined by the relation (5), the error is below a threshold limit (ξ), this region is defined as the acceptably correct region.

We will try now to define precisely the value of the threshold limit ξ. In Fig. 5, the locations XL and XR are boundary locations, separating right and wrong; this means that of these boundaries, X and Y must have the same value (Hatzopoulos J. N., 2008b, pp. 245) or, X=Y and therefore the Equation 4 on these boundaries becomes:

$$X = 1/X \text{ or } X^2 = 1 \text{ and } X = \pm 1 \qquad (6)$$

However, the threshold value of ξ is mathematically determined, and ξ=1. Accordingly, the boundary locations along the X-axis become XL = -1 and XR = +1 (see Fig. 5). The value of ±1 indicates the unit of measurement along the X and Y axes.

A closer examination of Fig. 5 indicates that if there is a being committing in all thoughts and actions, zero error could not be a human being and must be a Supreme being having all virtue values ranging from minus infinity to plus infinity. Therefore, human actions that approach zero error also approach the Supreme Being. This also indicates that a Supreme Being has no human weaknesses.

3. TOP-DOWN AND BOTTOM-UP APPROACH

Such approaches are based on the system's theory, as shown in Fig. 6. According to Dr. Chiva Ayyadurai (2023), there are two kinds of systems: one called dam has five parameters: input, output, transportation, processing, and storage. The second one is called the intelligent system and has all five parameters of the dam system plus four additional parameters: goal, controller, disturbances, and feedback.

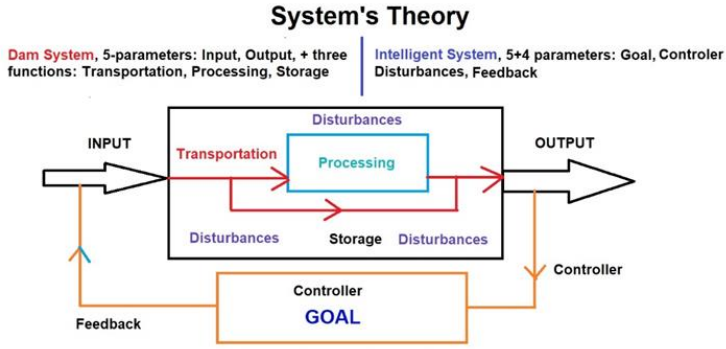

Fig. 6. The system's theory. Source: Dr. Chiva Ayyadurai, 2023.

The top-down approach utilizes an intelligent system, the goal being to maximize profits with minimum disturbances from the citizens. In energy matters, the maximization of profits often leads to rising prices, which can cause public unrest or system disturbances. To face such disturbances, the system controller evaluates the situation and, through the feedback, adjusts the input to minimize disturbances. Input is typically entered through the mainstream media (MSM) (Mainstream Media, 2020) and various clubs controlled by the elite. Output is the reaction of the people and the state of the profits. If the public is educated, they will search and find out whether the price of energy is within the external balance limits. If it is not, they will continue to protest together until they are satisfied. The educated public will not change its actions, regardless of the modifications in input recommended by the system controller. Such modifications (Dr. Chiva Ayyadurai, 2025) could divide people into groups of opposite fabricated ideologies to fight each other, use legislation and police force to limit their protests, use lies and/or computer-generated graphic images (CGI) together with deception techniques to diverge their focus

of interest, use paid anti demonstration groups to fight people who demonstrate peacefully and many other methods to have more efficient control over the citizens to minimize disturbances and maximize their profits. It is evident that educated people easily detect such modifications recommended by the controller because they are contrary to science-derived ethical values, such as internal and external balance, and educated people do not create desirable outcomes for the elite. Therefore, the elite must adjust the price of energy by limiting their profits (within the mid-space of virtue – external balance) until the educated public agrees with such an adjustment and stops the uprising.

The bottom-up approach also uses the intelligent system. The goal is to minimize energy prices while maintaining external balance regarding the profits involved. Input encompasses all factors necessary to harness energy sources. Processing derives the costs to obtain the final energy products. It adjusts the price in the output so that the profit for those involved in obtaining the final product is within the mid-space of virtue or the external balance limits. The disturbances typically include unexpected events throughout the process, such as physical hazards, depleted resources, or newly available resources, which the controller evaluates. The controller then recommends modifying the input to account for these new factors.

Furthermore, the internal and external balance could be described by the system's approach using an intelligent system. For internal balance, input is represented by the mind state, which consists of three values: Logic, desire, and anger. The goal is the Logic to be in command and manage desire and anger. Processing uses Equations 2 and 3 to calculate the human error, and if the error is within the mid-space of virtue limits, there is internal balance; if not, the controller (Logic) recommends the adjustment of the mind state and its values of Logic, desire, and anger. Disturbances are anti-education efforts, affecting desire, i.e., through marketing, or affecting anger, i.e., through cowboy movies. Such disturbances are evaluated by the controller (Logic), who recommends adjustment to the mind state inputs accordingly. External balance works as described above for both the top-down approach and the bottom-up approach.

CONCLUSION

Global energy management is a complex and challenging subject that requires innovation to make it more soluble and straightforward. We propose in this study simple ethical scientific models based on the Natural rule of balance, which makes most problems of this kind soluble. Internal and external balance are straightforward models developed by the giants of human intellect, Plato and Aristotle. The former addresses ourselves and a way to domesticate the animal we carry within us, while the latter addresses our actions. The present research demonstrates that all we need to do is take a step forward, utilizing scientific bases such as mathematics, and integrate these two models into all levels of the education system so that it delivers education, not anti-education, as it usually does. Furthermore, these two models must be the basis for all human science and technology fields.

This study also showed that having developed science-based ethics, we can utilize the system's approach to address most global issues, including international energy management, concluding that the bottom-up approach is more effective and just. Therefore, if people are educated and able to understand the anti-education process and stop it, either a bottom-up or top-down approach would lead to similar outcomes.

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