

Ideals in Education for a world of peace, quality and prosperity ¹

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Abstract

This work deals with the effort to define basic ideals for the education of the people. Such ideals must be of diachronic value and have a wider acceptance at international level. The effort intends to cover current needs at the globalization era and strengthens considerably any movement which advances in this direction. To found such ideals, it is analyzed the operation of human mind in both levels, anatomic, as based on neuron networks and as a system, with main system components logic, desire and anger which represent human behavior and human error. Consequently, the boundaries of wrong and right which determine the midway of virtue are ideally defined so that people have a clear direction as for the way to follow in an effort to be educated and live a virtuous peaceful life with quality and prosperity. The process followed uses a scientific way based on mathematical relations to study and analyze philosophical structures which are used to define the ideals in this work.

KEYWORDS: Education, healthy mind, virtue, boundaries of wrong and right, ideals

1. INTRODUCTION

The most serious problem education is facing internationally, is the weakness to scientifically define the boundaries of wrong and right so that such boundaries are clear and merit a wider acceptance at international level. The present situation is such that every social group has its own rules which define the wrong and right and many times the wrong for one group is right for another group and in this way it is created a conflict which may lead to a collision and war between these groups. This situation creates confusion to the person of any age because it is understood that at least one of the collided groups is wrong. This phenomenon is particularly intense among young people, who are aware of this situation because of globalization, internet etc., they do not trust the education system which is imposed upon them by the social environment and as a result they usually move towards the wrong way to find the truth. Therefore, education has to be absolutely honest with the people and in order to achieve this has to be based on the scientific way of analysis to find the truth within human dimensions, away from biases, prejudicialness, sick imagination, false hopes, secrecy, and wrong ideals.

Ideals in education based on scientific bases have been developed from the ancient Greeks and although some famous philosophers and educators have tried to promote such work (Jaeger Werner, 1945), today, we are at the point where: "... *the reader or the listener of modern philosophy lectures, when closes the book, or, leaves the lecture room has the feeling of an empty space*" (Papanoutsos, 1984). Papanoutsos 1984, referring to the ancient Greeks says that: "...*they (the ancient Greeks) never became theoreticians of the study room while, the philosophers of our time are such theoreticians*". However, philosophy is the one to exercise criticism and raise questions over any sort of ideals, used to educate people, in order to be tested on whether they have diachronic value and wider acceptance. The ancient Greeks have developed such philosophical structures and therefore modern educators have to study them very well and then advance from there on not by the "*theoretical way of the study room*" but being down to the earth within human dimensions.

This present work in its effort to find such ideals is analyzing two fundamental philosophical structures the one from Plato's work "The Republic" and the other from Aristotle's work "The Nikomachean Ethics" and advances from there on to develop the human mind space and the

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healthy mind using mathematics. Parallel to this and in order to scientifically define the boundaries of wrong and right, the functioning of human mind is approached in a scientific way together with its components which describe it as a whole, as well as, its inherent capacities and limitations in its effort to think and do the right thing. This research is reviewing the perception about education which at the present time contains many uncertainties and it is usually limited on matters which concern the knowledge without giving particular emphasis on the right use of knowledge.

2. HUMAN MIND AND ITS FUNCTION

Neurons and neural networks are well known from related simulations using appropriate computer software to solve usually complicated problems. Neural networks provide never absolutely correct solutions. If for example, a neural network is asked to perform the multiplication two by three, the answer will never be six, except by accident. However, a neural network can be trained to approach the result of six at any desirable precision, but will never achieve it exactly, except by accident. Human mind is hosted within human brain and human brain is based on neural networks, therefore, any human mind function cannot be absolutely correct. Of course everybody knows that two by three is equal to exactly six because, on the one hand the multiplication table is known by heart (resides in human memory), on the other hand it is easy for human mind to accumulate in memory multiples of integer units, in this case, it is accumulated two times three integer units. The easiest way for someone to understand how neural networks work, and how they affect the functioning of human mind, is given in Figure 1.

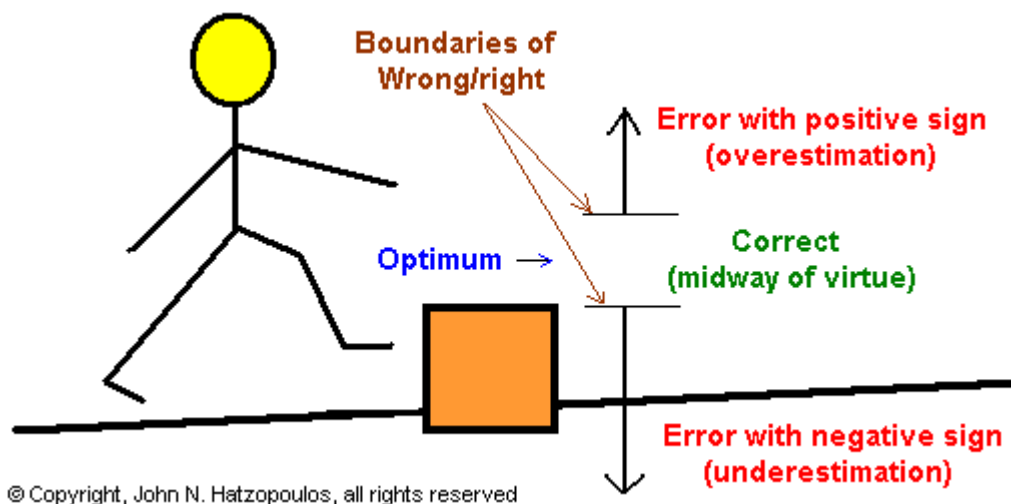


Figure 1. The functioning of a neural network and the boundaries of wrong - right (Hatzopoulos 2009)

As shown in Figure1, if someone wishes to walk over an obstacle during walking in a flat terrain, it is necessary to raise the foot. There is an “*optimum*” height to raise the foot, i.e., with minimum energy and minimum risk. However, raising the foot a little higher or a little lower from the optimum height, the action is considered as being correct because in this range there is no false step. If the height of the foot is lower than the correct height then there is a false step and the action may be considered error with negative sign. If the height of the foot is higher than the correct height then there is a false step and the action may be considered error with positive sign. The magnitude of the error varies from a temporary loss of balance and return to the right position, to a serious injury. However, if human error is to be quantified it will take values from zero to minus infinity and from zero to plus infinity (see also Figure 4). The midway (mid-space) which is defined as “*correct*”, is quite similar to the “*midway of virtue*” as defined by Aristotle and is going to be studied bellow.

Therefore, one may observe the following:

(a) The boundaries of wrong and right are quite clear and can be precisely defined.

- (b) The function of a neuron network structure has the following characteristics:
- a. A non trained neuron structure (for example, a little kid) the first time that will try to pass the obstacle it is likely to have a false step.
 - b. The next time that will try 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 an action with high error value the correct value is low and in an action with low error value the correct value is high.
- (e) Let X be the error value and Y the correct value of a specific action, then the function which relates these two quantities is as follows:

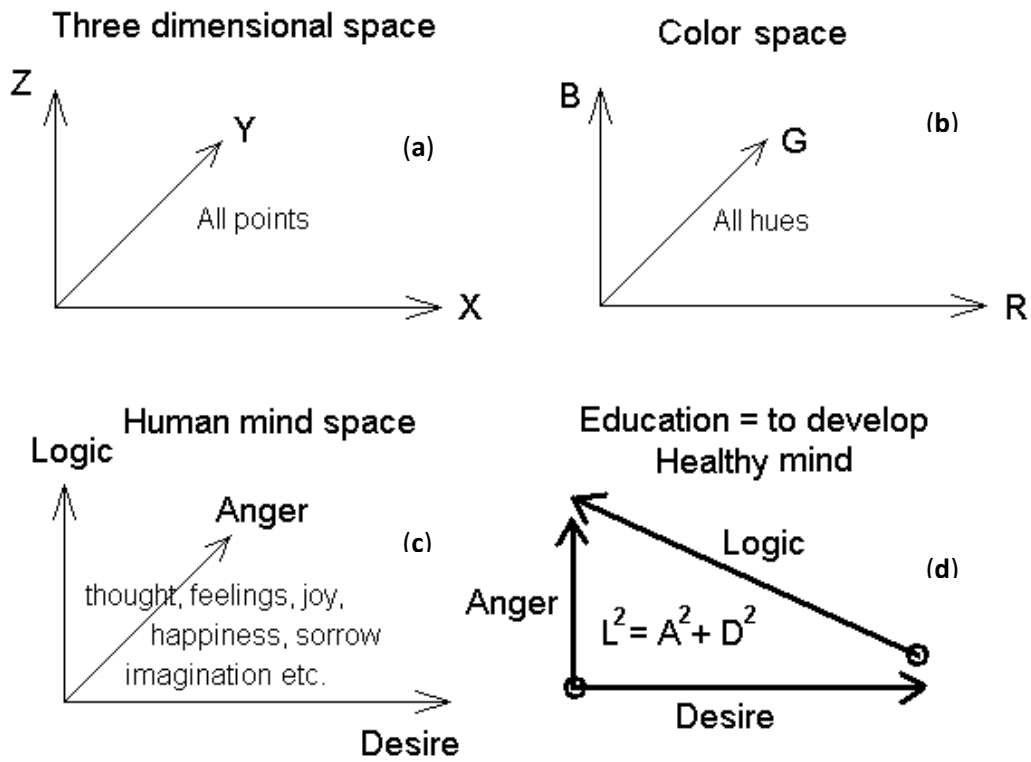
$$Y = 1/X \quad (1)$$

- (f) The mid-space of correct (midway of virtue) shown in Figure 1, contains a diversity of correct actions which define the degrees of freedom or the options a person has for this specific action to pass over the obstacle. Although this mid-space looks being small, it provides options of unlimited diversity and freedom.
- (g) Options outside the mid-space of correct (see Figure 1) cannot be considered as diversity options or freedom options because they do not help to solve the problem which is to pass over the obstacle and on the contrary they introduce difficulties because they may cause a serious injury.
- (h) Options outside the mid-space of correct (see Figure 1) are damaging options and they denote uneducated neuron structure, or bias, or, deception in the effort to pass over the obstacle.

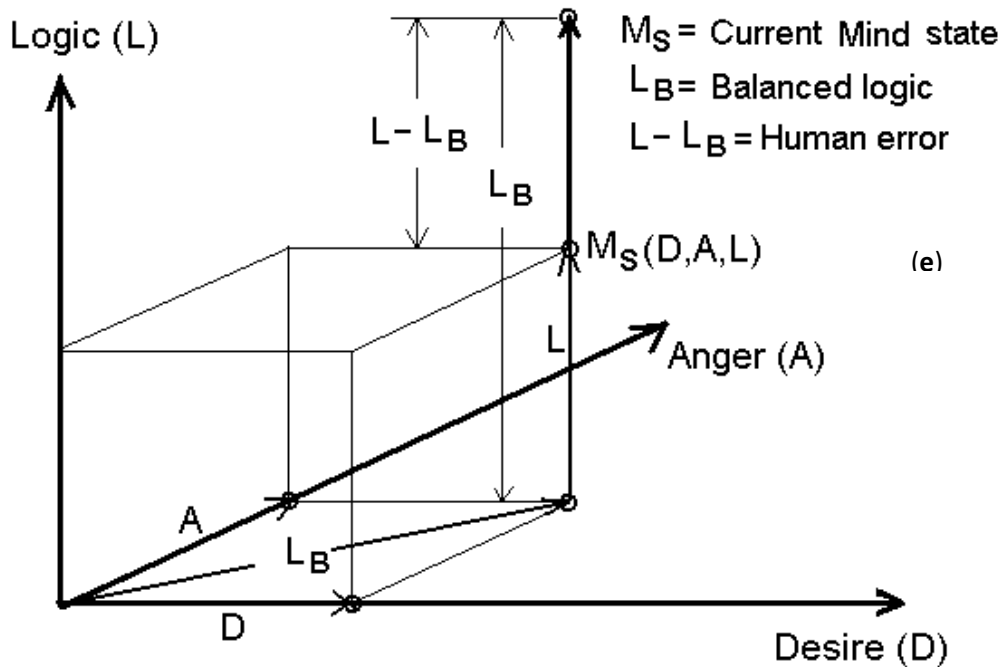
This example explains the way human mind functions as a neuron based structure. It must be noted that not all neurons of human brain are subject to training at will. For example, neurons responsible to control the function of the stomach, the digestion system, the blood circulation, the breathing system, etc., are already trained by nature to perform correctly while neurons which control the thought, the body movement and the motion of hands, the motion of legs, etc, are trainable at will.

3. IDEALS AND DEFINITION OF EDUCATION

Education in its effort to respond to its destination as a vocation system, has to provide such ideals to the educated person so that this person will try consistently to achieve the correct and minimize the error. Therefore, to define precisely education it is necessary to know how human mind works as a system. Human mind as a system has many functions such as: thought, joy, sorrow, anger, control over the actions, desire, imagination, feelings, etc. All these functions take place within the *mind space* which must be well defined. Mind space can be approached in a quite similar way to the three dimensional geometrical space (see Figure 2a), or, to the trichromatic color space which represents all color hues (see Figure 2b). However, the question is: are there three basic functions of human mind which can describe all other functions within the mind space? The answer comes from Plato in his work "*The Republic*" where human mind is described with three basic functions which are: *logic* (L), *desire* (D) and *anger* (A) as shown in Figures 2c, 2e. In Figure 2a is shown the three dimensional space system where the geometric position of any point is represented by three values (X, Y, Z) called coordinates. In Figure 2b is shown the color space where any color hue is represented by three values (R, G, B) called color coordinates and correspond to the three primary colors *red*, *green*, *blue*. Similarly, In Figures 2c and 2e is shown the mind space where any mind state is represented by three values (L, D, A) called mind coordinates and correspond to the three primary mind functions *Logic*, *Desire*, *Anger*.



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Figure 2. (a) Three dimensional space, (b) Color space, (c), (e) Mind Space (Hatzopoulos 2008a).

Plato's structure (L, D, A) is adopted in this work because on the one hand describes with three coordinates all mind states, on the other hand describes the *healthy state of mind* which is going to be used as ideal for the education of people.

Let us assume a state of the mind M_S with coordinates in the mind space $M_S(L, D, A)$, (See Figure 2e). According to Plato, the healthy mind state is defined when "*The logic balances the desire and anger*". Plato gives an example to illustrate the healthy mind as shown in Figure 3, where the desire is represented by a *blind horse*, the anger is represented by a *crazy horse* and the logic is represented by the *coachman* who tries to move the car in the

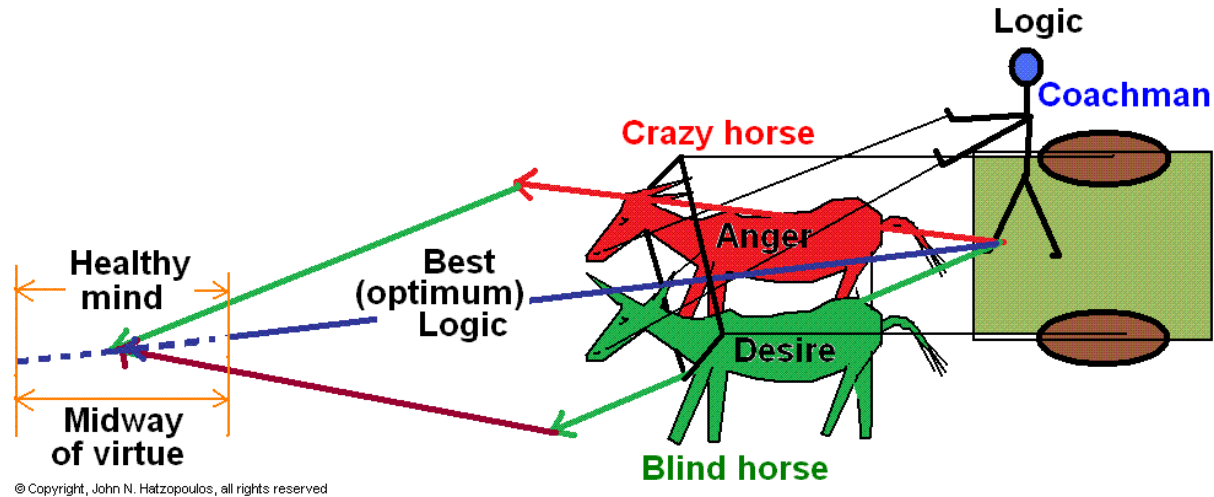


Figure 3. A healthy mind as defined by Plato where the logic balances desire and anger.

correct direction. This example illustrates the equilibrium of three forces and perfect equilibrium is obtained when the Pythagoras theorem is used (see Figures 2d, 2e) as follows:

$$L_B^2 = D^2 + A^2 \quad (2)$$

Where L_B is the balancing logic while L is the current logic corresponding to the current mind state $M_S(L, D, A)$.

This means that the effort of any mind action must be guided by the ideal that: "*Current logic L must approach as much as possible the balancing logic L_B* ". In this way according to Plato, Education is defined as: "*the effort to develop a healthy mind*". Plato is also supporting this argument by telling that: "*when the body is sick needs medical attention and treatment, when the mind is sick needs education*". However, it is evident that human mind is sick when the current logic is quite different than the balancing logic and this difference may be called *human error* and is given by the relation:

$$\text{Human error} = L - L_B \quad (3)$$

A careful look at Figures 1 and 3 reveals that there is a perfect logic (*optimum* – see Figure 1, *best logic* – see Figure 3) which is expressed by Equation (2) and also there is a correct logic which corresponds to a human error which is smaller than a threshold limit (see Figure 3). Notice that this threshold limit defines the boundaries of wrong and right (see Figures 1, 3, 4) and limits the area where the mind energy is correct (constructive) and this area is also defined by Aristotle as "*the midway of virtue*", or the energy of a healthy mind.

4. IDEALS AND DEFINITION OF VIRTUE

Virtue as a philosophical structure is analyzed and clearly defined by Aristotle in his work "*The Nikomachean Ethics*" (Tasios, 2003). According to Aristotle, virtue is a "*midway*" which means it is found in midway between two extreme actions, or, badness. Aristotle gives the

following example to support his argument: *“If bravery is a virtue then the brave person is to be found in midway, between the provocative and the coward person, ...and when one is brave, then the coward will call her/ him provocative because she/he is beyond coward’s capacity, while the provocative will call her/him coward because she/he is beneath provocative’s capacity... ”*. Accordingly, one could characterize thrifty as a virtue that is to be found in midway between stinginess and overspending and the stingy will call the thrift as overspender while the overspender will call the thrift as stingy.

Aristotle also defines the person of virtue *“as the one who is trying to be a person of virtue”* which means that virtue is the effort to maintain actions within the midway and which allows anybody at any moment to be a person of virtue (*never is late*). According to Aristotle the person of virtue is not the one who commits no errors but is the one who is trying to minimize human errors. This definition of virtue is completely fitted within human dimensions and under certain conditions it may allow extreme actions to take place, as is for example, self defence. Aristotle also accepts that justice is the top virtue and contains all virtues.

The Aristotelian midway of virtue has a universal validity, for example, taking into consideration the orbit of the earth around the sun, one may observe that the earth will never follow exactly the same path and there is a midway where orbits of the earth must occur in order to have equilibrium. If the earth gets off such bounds towards the inside, then the earth may collide with the sun, if the earth gets off such bounds towards the outside, then the earth may get lost in space. This example defines also precisely the boundaries of wrong and right where wrong occurs when the earth tends to collide with the sun (negative error) or tends to get lost in space (positive error) while right occurs within the midway of orbits which follows until now.

Virtue as defined by Aristotle is in agreement with the neuron based structure of human brain and consequently with the function of human mind (see Figure 1), as well as, with the definition of education given by Plato (see Figures 2, 3) which now can be integrated to: *“Education is the effort to develop a healthy mind to the person of virtue”*

5. IDEALS AND THE DEFINITION OF DEMOCRATIC PROCEDURES

Virtue, as defined by Aristotle is clear and not unambiguous but it is important to notice that an entire process exists so that one finds the midway or the mean even of a natural object. For example, in order to locate the middle of a straight line segment, a topographer uses a process that includes accurate surveying instruments which perform measurements of angles and distances, mathematical calculations and statistical treatment of measurements and concludes: *“the point in the middle of the straight line segment is here (showing a nail or a stake) with 95% probability of having error less than one centimetre”*. Notice that *“midway”* can also be expressed as a *mean* (μ) together with its *variance* (σ^2). The process to locate the midway of virtue is not therefore an easy task, because everyone may understand the midway as a different intermediate location. Thus, it is important to locate it with as much consensus among people as possible, something that ensures democratic procedures. In this way, democratic procedures are philosophically founded and constitute the process of locating the midway of virtue.

It must be theretofore noticed that, a consensus has a meaning if and only if the voters have unlimited freedom with minimized bias (Hatzopoulos 2004, 2008a) which can only happen if the voters are educated according to the definition of education given by Plato so that they maintain a consistent effort for a healthy mind and their views and actions are correct and virtuous.

6. MATHEMATICAL DEFINITION OF THE BOUNDARIES OF WRONG AND RIGHT

The above analysis has shown that human error can be quantified and its magnitude is varied from zero to plus infinity and from zero to minus infinity. Therefore, human error can be represented by an X - axis as shown in Figure 4, which is expanded from minus infinity to plus infinity. Similarly a Z - axis which is perpendicular to the X - axis through the location of zero, represents the number of people who commits, or, votes that commits in the corresponding category of error. No matter how strange it appears that someone is able to

accept, or, vote that commits a specific error, this happens and it is quite clear. For example, the political parties declare clearly the category of error they belong to, the same thing happens to many social groups which declare their difference from other social groups. In this way the error or the bias of any social group can be relatively easy quantified and a diagram as shown in Figure 4 can be created.

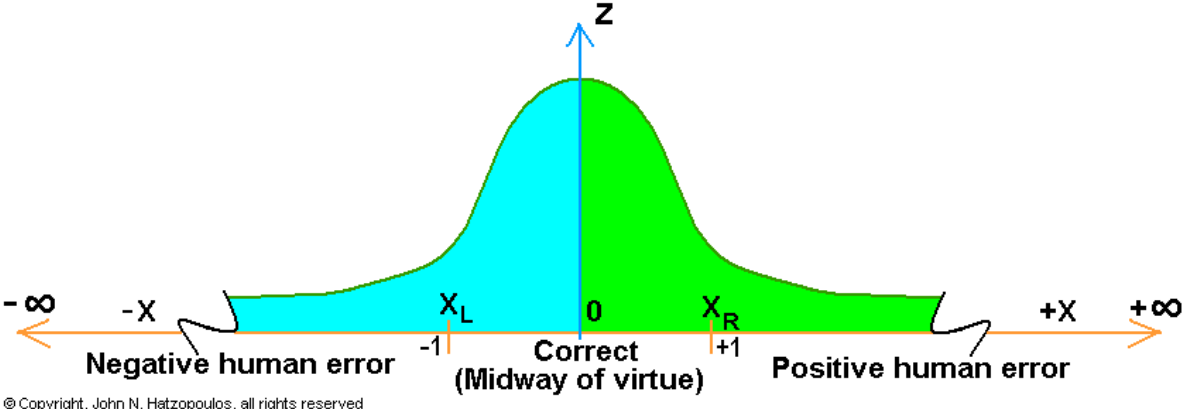


Figure 4. The error diagram of the ideal society showing the human error in the X – axis and the number of voters in the Z –axis.

It was discussed that when human error is below a threshold limit it is considered as correct (see Figure 1, 3). Therefore, it will be an effort to define this threshold limit which in Figure 4 is represented by the locations of X_L and X_R in the X – axis. The locations X_L and X_R are the boundaries which separate the wrong from the right (Hatzopoulos 2008b pp. 247, 2009). Taking into consideration Equation (1) which expresses the correct in relation to the error, then we are seeking these boundary points in the X – axis where we have:

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

Substituting Equation (4) to Equation (1) we have:

$$X = 1/X \text{ or } X^2 = 1 \text{ and therefore } X = \pm 1 \tag{5}$$

In this way the boundaries of wrong/right are defined in a mathematical way and they are:

$$X_L = -1 \text{ και } X_R = +1$$

Notice that there are an infinite number of correct options in the midway space between -1 and +1 and therefore there is unlimited diversity and freedom. On the contrary as discussed before, the choices outside this midway space are not choices of freedom but they are choices of uneducated persons, or, they are biased choices and generally they cause damage and destruction. If the distribution of votes in Figure 4 follow the normal distribution, then the curve in Figure 4 is better represented by the *Gaussian curve of standard normal distribution* with mean value $\mu = 0$ and standard deviation $\sigma = \pm 1$ (Hatzopoulos 2004, 2009). One may observe that the boundaries of wrong/right are evaluated to be unique points as being *turning points* in the Gaussian curve (the radius of curvature changes over these points) thus the boundaries of wrong/right are also defined in a geometrical way. Notice that this midway space can be used as a unit of measurement with magnitude of: 1σ , 2σ , 3σ , etc. Basically the diagram in Figure 4 represents the ideal society where in the midway of: 1σ the 68.26% of human actions are virtuous and therefore correct. Within 2σ , there are 95.45% of human actions and within 3σ , there are 99.73% of human actions. However, if 68.26% of human actions are correct, then 31.47% of human actions are in the neighborhood to be

correct and only a magnitude of 0.27% of human actions may be considered as extreme actions or dangerous and seriously damaging actions. One also may observe that the diagram in Figure 4 represents both the ideal society and the *specifications on which nature has been based in designing the error performance of human mind*.

Unfortunately, ideal society does not exist and the real society error diagram is shown in Figure 5. The real society, as shown in Figure 5, is composed by a large number of people to be located in the virtuous, or, correct region and many other smaller groups of people with various biases. It must be noted that the destructive energy of a group of people is equal to the number of people in the group multiplied by the bias of the group (Hatzopoulos 2004). Considering that bias works as a lever and it may be of a magnitude approaching infinite, then it is evident that a small group of people could accumulate a tremendous destructive energy. Usually groups of people with opposite biases move into conflict, wars and collisions and peace may be obtained if they have equivalent destructive energy. Usually world peace is obtained if the error diagram in Figure 5 has a symmetric structure and furthermore, if there are small biases there is a stable peace, while if biases are large there is unstable peace (Hatzopoulos 2004). Bias is also responsible for the deterioration of the environment and the social injustice.

Therefore, education has to explain to the people the structure of the real society today and help them to understand that peace, quality and prosperity in life can only occur if all groups of people minimize their biases. The best way to do this is to understand and evaluate the reasons groups of people maintain such biases and consequently to create motives and peaceful ways to minimize them. People must also be educated to evaluate correctly the destructive energy of small groups and pay the necessary attention.

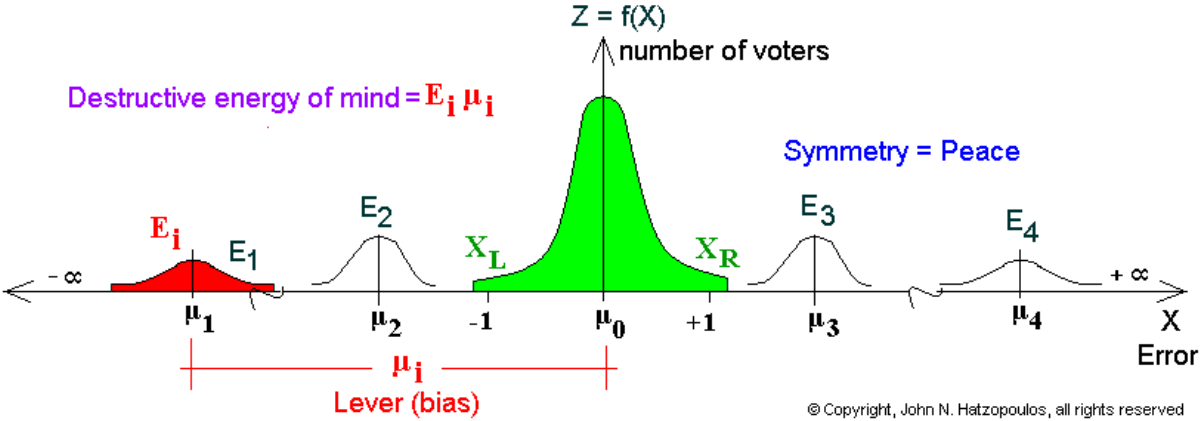


Figure 5. The situation of the real world with groups of people with biases $\mu_1, \mu_2, \dots, \mu_n$

Considering Figure 4 one may raise the question “what happens in the location $X = 0$?” is there any person to vote as having at all times zero error? According to the previous analysis human mind is hosted in a neuron based structure and therefore it is impossible to act without error. If, for example, one may pass over the obstacle in Figure 1 several times, each time the height of the foot over the obstacle will be different. However, we may introduce a mathematical entity with zero error and call it “*supreme being*” with all its thoughts, actions and performance to have zero error.

The extraordinary of this hypothesis, as shown in Figure 6, is that if someone approaches the location $X = 0$ from the direction $X = -1$, then the Y – values which represent the magnitude of “correct”, or, “virtue”, tend to approach minus infinity. Therefore, if someone approaches the location $X = 0$ from the direction $X = +1$, then the Y – values which represent the magnitude of “correct”, or, “virtue”, tend to approach plus infinity.

This analysis can help to understand that any effort to search for the attributes of the supreme being must be focused on the fact that such a being must have no human weaknesses and as such ideal must be used to educate people.

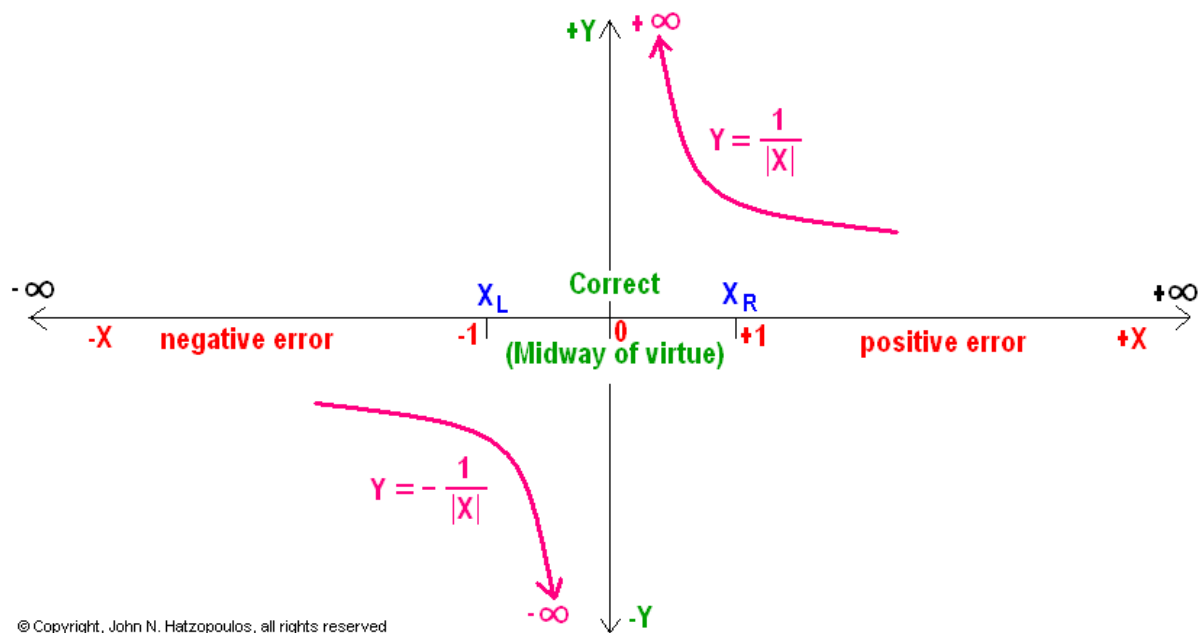


Figure 6. The correct/error function in the location $X = 0$, reveals an entity with zero error and a virtue which is expanded from minus infinity to plus infinity (Hatzopoulos 2009).

Furthermore, it must be noted that the quantification of the “correct” or, “virtue” has only theoretical meaning in the process to study the behavior of the wrong/right function and having in mind that for any human thought, action or performance, wrong and right coexist. However, in practice, “correct”, or, “virtue” cannot be quantified and if, for example, someone is judged from the justice system as innocent, is not judged as more or less innocent, while if someone is judged guilty then may be judged more or less guilty (offence, felony, crime, etc).

7. MATHEMATICS AND THEIR DIDACTICS IN THE DEVELOPMENT OF HUMAN MIND

According to James Franklin 1995, mathematics is the science of structures and as shown in the above discussion it has a significant impact on the complete analysis of the philosophical structures of Plato and Aristotle. Without the use of mathematics such analysis would be incomplete. Therefore, mathematics as a tool of mind can help humans to be more active citizens, to increase the mind constructive activity within the midway of virtue on efforts such as peace, justice, quality in life, prosperity, social relations, nature conservation and protection of the environment. However, it must be realized that by eliminating mathematics from any scientific field of studies, the analysis performed there would be incomplete. On the other hand, separating the scientific areas in natural sciences which are based on mathematics and in human sciences which are not based on mathematics, virtually, as it was said, it is removed from human sciences their scientific completeness. This remark is very important and at elementary and high school level must be taken actions to improve didactics on mathematics so that all people have a significant mathematical background particularly those they are not talents in mathematics.

Geometry can also support didactics in mathematics because no matter how complicated geometrical structures are, they are easily understood as based on figures and diagrams. Notice that in the main entrance of the philosophical schools of Athens before the *dark ages* it was written the inscription “*Do not Enter if you do not Know Geometry*”.

The situation today regarding the performance of students in mathematics is that only a 20-30% of the students who are talented in mathematics understand and digest the theory without a problem. The majority though of the students 70-80% need special attention and help to understand mathematics. A didactics method which would help non talented students is to be used application examples from everyday life and such a method is known as the

R.E. Gross Problem-Solving Model (Gross R. E., Zeleny L. D. 1958). A full example of this method is given by Manolas E., 2006. Furthermore, if the *R.E. Gross* method is enhanced with computer programming where both the educator and the student are trained to perform, then there is the potential to obtain quick results on simple and complicated application problems, which in turn creates motives to the student to study further the theory (Hatzopoulos 2008b, pp. 656).

The enhanced R. E. Gross method which uses computer programming and which can also get involved with open source programming, can be used to improve didactics in mathematics at all grades and levels of education. It will also help the student to become "*smarter than the machine*" and not to be a "*button pusher*" which is highly important in the high technology and globalization era (Hatzopoulos 2008b, pp. 656). In this direction is also oriented work done by Noss R., & C. Hoyles 2007.

A serious problem that exists in the didactics of mathematics is that those educators who are top mathematicians usually they do not like applications, also they do not consider mathematics as a tool of human mind but they consider it as an entity with extraordinary attributes. This consideration may help them to be top researchers but it does not help them to be good teachers and this is something to be given a serious consideration particularly in the primary and high school education level.

8. CONCLUSIONS

The following conclusions may be extracted from this present work:

Education must be clearly defined as: "*the effort to develop a healthy mind to the virtuous person*" with detail explanation using scientific analysis for the meanings of "*healthy mind*" and "*virtue*". These two meanings must be the ideals for the education of the educators and the people.

The meaning of "*democracy*" as an ideal must be founded on the effort to locate the midway of virtue with voters having education and therefore minimum bias.

The boundaries of wrong and right must be explained to the people using a scientific way as it was analyzed in present work, away from biases, prejudicialness, sick imagination, false hopes, secrecy, and wrong ideals.

The scientific approach to find the truth enhances the ideals of "*healthy mind*" and "*virtue*" and it helps people to actively participate in the solution of current problems such as peace, justice, quality in life, prosperity, social relations, protection of the environment, etc, thus maximizing the freedom for the constructive contribution of human mind.

The typical education must help people in a scientific way to understand that the meaning of the supreme being as an ideal does not imply any human weakness.

The analysis performed about human error must be carefully examined by the people from human sciences (philosophy, literature, history, law, justice, political sciences, social sciences, etc) in their effort to improve the scientific approach in these fields taking into serious consideration the quantified human error and maintaining their course within human dimensions. Part of such improvement must be the increased use of mathematics as a basic scientific tool for the analysis of relevant structures in their area.

It is important to improve the didactics in mathematics by considering it as a tool of human mind in the effort to make a complete analysis and synthesis of simple and complicated structures. Mathematics and computer programming are matters which support each other and provide motives to further study the theory in mathematics and the optimum use of modern technology. The target of typical education must be that a 70% of the people obtains a strong mathematical background and this can be facilitated by the proper use of geometry.

The educators and the youth must realize that human mind is the highest power in universe and it must be developed in a healthy way to be able to perform correct and virtuous actions which are necessary for someone to be considered as educated.

In conclusion, healthy mind and virtue is a unique way for someone and a social group to have peace, quality in life and prosperity and to be able to face serious problems as is the protection of the environment and other problems related to wrong human activities.

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Professor John (Ioannis) N. Hatzopoulos, was born in Komiaki (Koronida) of Naxos, Greece. Graduated from National Technical University of Athens (NTUA) and received a diploma in Rural and Surveying Engineering. Ranked the first among the graduates in 1971 and was awarded the Chrysovergion Prize. Did his army service and then worked as a surveying engineer for three years before having been awarded a research assistantship at the University of Washington (UW) Seattle, USA, in 1975. Finished his MSCE degree at UW in 1976 and his Ph.D. degree in 1979, while working on various research projects in Photogrammetry and Remote Sensing. Was offered two positions: as an Assistant Professor at the University of Illinois Urbana Champaign and as an Associate Professor at California State University Fresno (CSUF). Took the second offer and worked at the CSUF Surveying Engineering program. His contribution to the program was that it became one of the top programs in the country. In 1982 was awarded the Outstanding Professor's Award. Was promoted to the rank of professor and got tenure in 1984 and worked at CSUF from 1980 to 1989. Resigned from CSUF and joined the Department of Environmental Studies at the University of Aegean, Greece, as a Professor since 1989. Established the Laboratory of Remote Sensing and GIS at the University of Aegean and is the Director since 1995. With the help of his colleagues, also established the Extended University Program of Environmental Cartography, and was the Chairman of the department from 1998 to 2001. His activities involve teaching, research and consulting in geomatic engineering, geospatial information science and technology and computer-related applications. Is a Member of the Technical Chamber of Greece since 1971 and of the ASPRS since 1976. Is an ASPRS certified photogrammetrists (1986) and a professional Rural and Surveying Engineer in Greece.