

Knowledge-Based Incremental Change-Model Of Human Behavior

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Abstract—Human behavior and social norms are closely intertwined. Both feedback and feed-forward into each other. Appropriately mentored they govern the society and culture to move forward and conversely they cause ripples in any social entity and disrupt its stability. This situation is blatantly evident by the second wave of Covid-19 during 2020. In this paper, we present computer-aided approaches and methodologies to resolving such intertwined problems and their solutions. The approach is feasible for human, corporate, social, and national problems. The answers are embedded and tied to the needs and motives of these entities. Though not very accurate and error-proof, they produce practical solutions the short- and long-term problems in resolving their needs without rapid and unexpected fall of behavioral norms, morals, and ethics. Entirely human institutions are soon corrupted by the self-interest groups and selfie-politicians. A certain blend of philosophic balance (via the wisdom machines), practical necessity (via the knowledge machines), and current socio-economic environment (via computers and information processing systems) are presented. This balance may be periodically adjusted to suit the collective dynamics in society. When the lag time for the adjustment is appropriately regulated, much of the “noise” in the society or nation can be critically damped not to interfere with the protection of social ethics by “selfie-noisemakers” in a nation, a society, or a culture.

Keywords—Time, Noun Objects, Verb Functions, Convolutions, Knowledge and Time

I. INTRODUCTION

The communication networks, fiber-optic connectivity, and switching systems are incorporated to provide a bug-free and virus-free Internet access. The possible outcome of the approach suggested is the efficient use of resources to move an individual, a society, or culture from a static error-ridden impasse to a newer norm that is in line with what the entities would tolerate with the due and necessary effort(s). The entities are treated as noun objects (*no*'s) and the effort(s) are symbolized as (*vf*'s) with the intelligent convolutions (***'s) making the elemental effort in a series of efforts to be symbolized as (*no*vf*). A large number of such symbols (*no*vf*)'s coherently coupled lead to a macro-resolution of collective entities such as societies, cultures, and nations!

One of the desirable consequences is the generation of new knowledge generate by a series of coherently ordered (*no*vf*)'s is that an incremental knowledge (Δk) gained in the series of the elemental process(es) by a symbol $\Delta k =$

(*no*vf*). Integrated knowledge ($K = (\sum (\Delta k).dt)$ or $= \int (f(time, culture, time).dt)$) classified and made available via the Internet knowledge banks (*KB*'s) makes the large entities such as nations and cultures move forward on a global basis in a controlled, cogent and coherent fashion.

It is well known that the motivation to act is derived from the deficit need of any individual biological system, and the organizations, and even nations. The gratification of the need partially or totally extinguishes the need and the species simply move on the next deficit need. Age, society culture, and temperament dictate needs at any given time. This rather simplistic explanation is grossly inadequate to explain the behavior to intelligent species that seek effective and Internet-based humans, nations, and cultures.

Their intelligence resides in reaching the fine details as to investigate the entire chain of events from the source of the needs to the economic and optimal use to the resources at their disposal to gratify the need completely. This leads to numerous types of needs; such as (a) recurrent needs, (b) frequent needs, (c) rare or one instance need. Different strategies and solutions emerge. These are treated accordingly but try to reach the same economic goals based on optimality, effectiveness, and return on investment [1] that follow Maxwell's Laws of economic behavior [2] modified by the von Neumann's strategy [3] when the options and resources (including knowledge) are limited. Various contributions have resulted. For example, Peter Ducker's guide the Practice of Management [4], Eric Berne's explanation of behavior in the Games People Play [5], Maslow's classification of the needs [6] and his organization of individual needs.

Many significant developments in the primal contributions have resulted. Whereas Maslow's explanation was based on an intelligent individual in a rational and informed society, his concepts have been extended to corporate environments since corporations and organizations have needs and resources to gratify their needs. For example, in 1978 presented numerous papers and concepts for corporations [7] and nations [8] by combining the need pyramids [6] and the practice of corporate management [4]. In the late 1990s, the concepts were extended to network management since network management entails the need for bandwidth allocation and network resources such as switching capacity of their characteristics [9,10] and further the organization to manage small national Governments [11], etc. It becomes evident that large nations (such as the US and European Countries) need sciences and strategies for each of the Departments of State. Still, the concepts of managing a

national need, the fundamentals of economics [2] and details based on strategy [3] for matching needs against resources over time are applicable. These goals can last over a four-year duration of the presidency or even over the prolonged commitment to a noble cause such as the abolition of slavery, curtailing plastic pollution, cleansing of Nature, environment, seas, etc.

II. NEED PYRAMIDS AND THEIR STRUCTURES

From Freud [12] to Maslow the triangular need pyramids have been deployed to classify the motivational behavior of human beings (see Figure 1a). Under the scrutiny of the Internet age and the knowledge available in the knowledge banks, these earlier models seem to fall short in explaining the human behavior of the knowledge worker in an Information age and knowledge society.

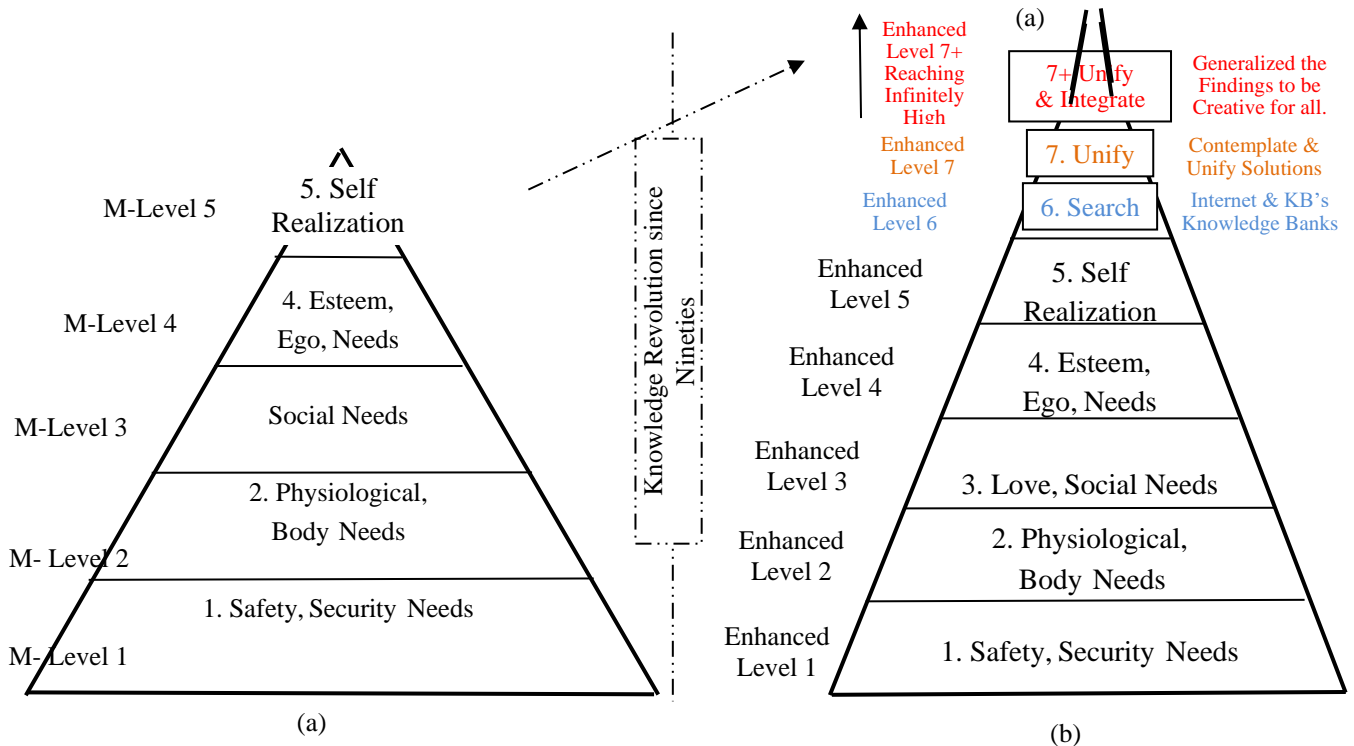


Fig. 1. The enhancement of human activities since the evolution of the Information and Knowledge Revolution

In the post-communications-networks era, when much of the populous depends on computers and handheld devices, the behavior for searching for the best solutions to problems is a normal activity. Three changes have occurred. *First*, computers and handheld devices in use most of the time everywhere. *Second*, more than the search itself, the underlying commonality of concepts in the solutions and their unification of the already known solutions are also an activity and behavior in its own right and *third*, the need or desire to deploy the newly acquired knowledge to be generic and useful. This dormant trait for being considerate and ethical has reemerged during the early 21st century. The influence on human behavior for being helpful to other human beings plays a decisive role in making the need pyramids infinitely high (see Figure 1b); almost consuming the good nature of the Internet knowledge worker.

Behavior is a recursive phenomenon; all species repeat patterns of behavior that have proved to be useful in the past especially when these are optimal and well understood and proven. Even the body deploys such repetitive defenses against bacteria and viruses unless they become ineffective. Then, the body (intelligently) modifies the behavior

represented as lemniscates (see Section III.B) to suite the strains of infections!

In general, routine patterns may be enclosed in recursive loops and these loops may be embedded in other loops¹ such as circles and lemniscates. Circles being too simplistic do not offer enough flexibility to model the behavior of (any) species, system, nation, society, or culture; however, the lemniscates offers a compromise for depicting insidious and subtle nature of changes in extraneous factors² such as times, age, culture, etc. One

¹ Conceptually, any shape may serve a model of behavior, ranging from a single point to infinitely smooth loops and even hyperspace objects. The simple configuration (points, lines, triangles, etc.) soon indicate their limitations. An enclosed area or volume is indicative of some "work-done" in the resolution of needs or solution of the problem at hand. The curvature of the shape is indicative of the force influencing the change of "verb functions" to suit the problem and its solution.

² One lemniscates shape is not sufficient to accommodate all the effects of all the changes in the behavior. However a series of linked, recurrent, and slightly reengineered changes may be depicted in this recurrent model. These laminates may be linked, dynamic, and modifiable to model (all) most behavioral changes in daily lives of species and systems. The desirable shape of a lemniscates (in this context) is the lemniscates of

Bernoulli shown as  or in the shape of ∞:

such feature is the ability to place one loop within another and in a recursive mode, a series of lemniscates may be placed in another series thus offering the mathematical situation where one series of variables can become just a term in another series. For these reasons, we suggest using the lemniscates [13] to depict behavior.

III. BEHAVIORAL PATTERNS AND FLOWCHARTS

A. Gratification of Needs

If the need triangle has seven (or even five) levels, then the innate tendency is to address the lower level (say, level i) needs first and then proceed to solve the next higher-level need. The mind follows a six-step path in distinct patterns to resolve a need or solve any problem. The first and second steps are evaluated as what should be accomplished to gratify the need or solve the problem and the extent of need satisfaction that can be achieved. the third and fourth steps are based on a compromise that is necessary since absolute gratification is generally not feasible and then to evaluate a methodology to the gratification of the needs or solution of the problem. The fifth step occurs in finding the feasibility and acceptability in the implementation of the steps for the resolution of the need or solution of the problem.. Finally, the sixth step is the use and the reuse of the step involved.

In general, the use of these five prior steps, an urge to enhance the solution (or the steps) starts to appear. In its reuse for the next higher ($i+1$) level, the model or the steps may be (or need to be) enhanced since the nature of need resolution at the ($i+1$) layer generally need a better strategy for the solution.

From a slightly different perspective, the first three steps are: (i) the awareness **and** resolution of the need or problem at the i^{th} -level of the need pyramid, (ii) the compromising of satisfaction of the i^{th} -level need or the solution, (iii) in understanding the social structure that provides the means to satisfy the i^{th} -level need. The following two steps are: (iv) the resolution of the need or problem in conformance with the social structure, and (v) the evaluation of the costs incurred steps (ii) through (iv) and justification of the economic principle by balancing marginal costs incurred and marginal reward thus achieved. Finally, the derivation of the knowledge gained from five prior steps for their repetitive use of these steps for recursion in solving similar problems in the other layers of the need pyramid. This final step is where the natural intelligence of the species is far superior to ant AI algorithms embedded in knowledge machines, networks, or computer systems. This behavioral pattern of all species (Figure 2) is repetitive. In Nature, it has been embedded in resolving larger and more intricate problems. This figure is self-propagating and follows a flowchart as long as the need persists.

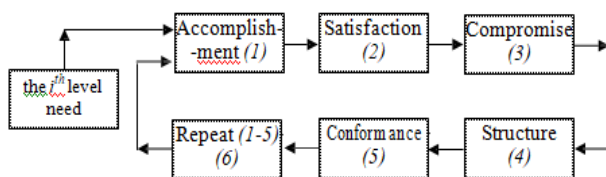


Fig. 2. Six-stage flowchart of processes involved in the satisfaction of the i^{th} level need; i ranges from 1 to 7 in the seven-level need structure of a human being. Optimality is reached in (6) since the loop repeats insidiously as well as it is triggered externally.

In a very philosophic way, it is appropriate to remark the life and needs to live are irreversibly intertwined in every life form; though irreversible in the time domain, they all bear a signature of rationality, programmability as the von Neumann’s machine during the formative years of life predictability

The six discrete steps in Figure 2 can now be rearranged slightly to make the flowchart follow the contours of the need hierarchy. A transformed figure is shown in Figure 3. It is not crucial that there should be only six discrete steps in the need resolution strategy. As far as a repetitive pattern and closed cycle are at work, this model will suffice. The repetition reinforces the six steps thus making the pattern stable and error-free (also as friction-free as possible) in that particular social setting. In an obvious way, the expenditure of resources is minimized and the need satisfaction is maximized based on Marshall’s law to maximize marginal utility.

B. From Flow Charts to Lemniscates

Whereas flowcharts facilitate the flow of objects, data in computers, and their associative *opcodes*, lemniscates facilitate the flow of concepts and ideas to program the *opcodes* in machines and to program verb functions to resolve needs and problems for human beings. In unison and cooperation, they facilitate the detail of the thought processes initially and then the details of the implementation of the verb functions to convert the thought into effort. The continuity of time is incorporated in the final implementation as $\Delta(\text{thought})$ becomes $\Delta(\text{action or } vf)$. This process is irreversible in the time but reversible in the concept and wisdom domains. The process of global learning is initiated that human beings do not repeat their mistakes (by social entities (or *no*) such as Mafia, Military Industrial Complex (MIC), Global Pollutant (Exxon-Mobil in Alaska Oil Spill), etc.) from scientific derivations from experience(s). Further, the machines based on the unified flow charts and lemniscates may help rebuild the prior more rewarding prior experiences

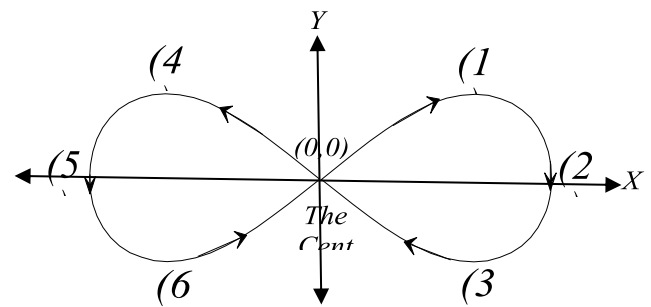


Fig. 3. Six-stage flowchart of processes charted as traversable lemniscates to depict the steps of human behavior in resolving needs or solving a problem. The coordinates X and Y are selected to indicate the direction of the effort or verb function (v) during the processes 1 through 6. A certain element of time ‘ Δt ’ is involved to trace the lemniscates (0,0) at ‘ t ’, back to (0,0) at ‘ $t+\Delta t$ ’

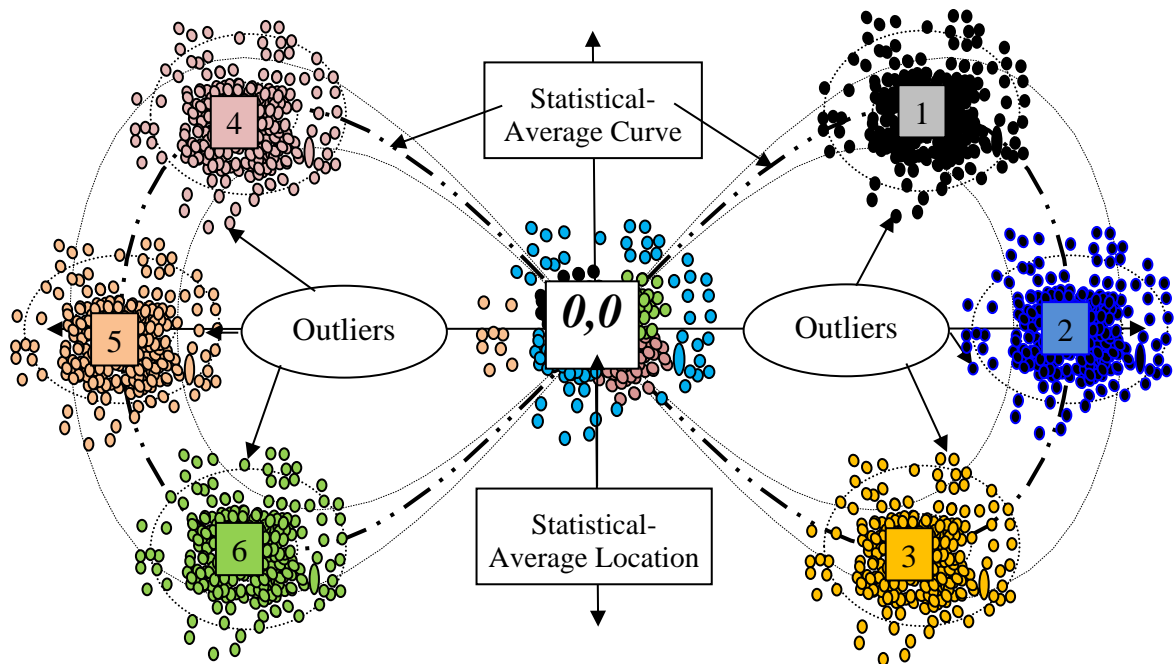


Fig. 4. Scatter plots of the verb functions vf 's, or actions at each of the six nodes 1 through 6 in Figures 2 and 3

Infinitely many full lemniscates may be generated by the angular rotations of the axes. The sizes may be scaled as the variations of the polar 'a' in the generalized polar equation³ of the lemniscates. These numerous shapes may be used to fill the entire need pyramid and all the layers in the Freudian and the Maslow pyramids. The behavior at these (X, Y, Z) coordinates in the confines of the pyramidal space will also become variable accordingly. In the enhanced pyramid and at the 7+ layer (see Figure 1b), all lemniscates possibly get mapped into One infinitely lemniscates. The recursion of this lemniscates is another philosophic question. Perhaps the answer lies in the question if infinitely high lemniscates are geometric at all!

Gradients⁴ of the curves at any point (r, θ) are indicative of the (internal and or extraneous) forces at that point to change the behavior. Areas of lemniscates are indicative of the effort in the behavior. For example, the area $((1/2).a^2)$

³ The polar equation for the figure shown is $r^2 = a^2 \cos(2\theta) = a^2 \cos(-2\theta)$. This is one of a very large number of 2D closed-loop configuration feasible. It is indicative of the very large number of individuals who is a member of the society. Individual shapes may vary radically for a very "selfie" individual to that of a very "saintly" individual. The model is conceptual and qualitative; it is not numerically related to the values $a, r, or c$ in the equations for the locus of point (x,y) . A large variety of formulations are available in encyclopedias, and text books in Mathematics. One of the popular shape of the lemniscates is the lemniscate of Bernoulli and it is traced by a point (x,y) that follows the Cartesian Equation: $\{[(x-c)^2 + y^2] [(x+c)^2 + y^2] = c^4\}$ where $2a$ is the distance between the two foci. Simplification leads to the equation $[(x^2+y^2)]^2 = 2c^2(x^2-y^2)^2$,

⁴ Gradients at any point in the suggested geometrical shapes are not numerical depiction of $dr/d\theta$ of the complex nature of any species. These shapes are fixed and rigid whereas the species are intelligent and adaptive. These models indicate concepts, trends, and modes of rather than a precise magnitude of the parameters.

of each loop in each lemniscate is indicative of the effort in the solution of a problem or the resolution of the particular need during the traverse. The knowledge gained in the resolution shrinks the area and the "work-done" in the next recursive mode. Thus the effort ("work-required") in solving problems of similar nature gets minimized. The behavior continues to evolve in solving larger and newer problems make the personality gets broader and/or higher by tackling newer challenges. It can be visualized that the geometric shapes get distorted for any particular individual as the effort and gradients can vary largely. However, the confines of the variations are determined by the norms of society. In a sense, the idealized lemniscates is a statistical average of a "statistical individual" (if such an individual exists) in a given society or culture. A certain amount of caution is necessary for implementing or generalizing the models presented in this paper

C. Shapes, Dynamics and Movements of Lemniscates

1) The individual as a unique member in the populous

Cohesive human societies become culture; however, a degree of freedom makes a human being an individual. The patterns of behavior depict this fact in the scatter plots of the activities or verb functions (vf 's) at boxes 1 through 6 in Figure 2 and at corresponding nodes in Figure 3. The individual vf 's are shown as dots in Figure 4 and the collective vf 's as scatter plots. Three lemniscates are shown to indicate contain these scatter plots. with the central lemniscates indicating the statistical average of the vf 's at each node.

As it is documented in all statistical surveys an idealized individual and the associated behavioral pattern do not exist. In reality, the behavior may be irregular lemniscates

generated by joining any one given point to another point in the next cluster (1 through 6) and after the sixth cluster, the origin occurs at (0,0). The next point in the sequence depends on the discretion of the individual to in the same layer of need gratification or to move to solve problems in the other layers.

2) *Need Layer Bound Transverse Mobility and Rotation of Lemniscates*

Lemniscates tend to remain layer bound if an individual makes an incomplete vertical ascend or descend up or down from the current i^{th} layer shown in Figure 5a. The center may remain in place but the angular orientation can vary giving a series of lemniscates. This scenario needs the least effort in changing behavior. The only minor effect may be expected. In contrast, when the entire lemniscates have to be shifted from location to another (Figure 5b) in the need frustum to the next more effort (and energy) is expended. Such changes can have colossal changes in behavior. An instance of the first scenario is when an individual (*no*) changes one type of restaurant to another in the same socioeconomic environment and an instance of the second scenario occurs when the individual moves from one country to another yet seeks to gratify a physiological need (to eat) in both instances.

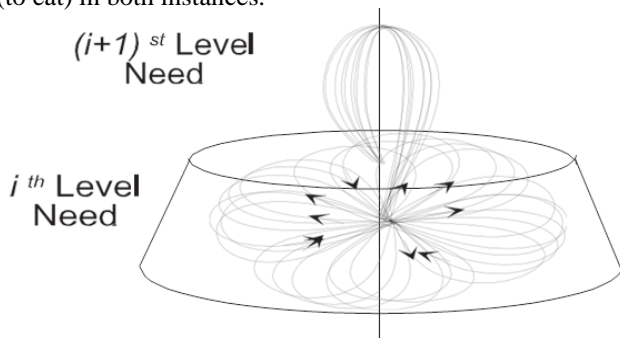


Fig. 5a Instances of rotation of Lemniscates to gratify a need at any i^{th} level of need. Very marginal expenditure if energy may be expected to hop lemniscates within the frustum

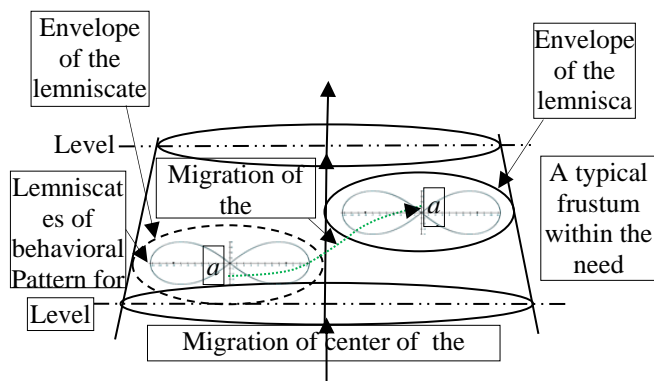


Fig. 5b Instances of a lateral movement of lemniscates to gratify a need at the i level of need. The expenditure of energy (and hence the behavioral change) becomes variable event dependent.

3) *Upward Mobility and Movement Across Layers*

Behavior of species is dynamic, intelligent and adaptive. These characteristic are essential for survival and adaptation. These adaptations are readily incorporated in the suggested model. For example, learning is displayed

(see Figures 6a and 6b) by the upward mobility if the lemniscates to suit the higher needs

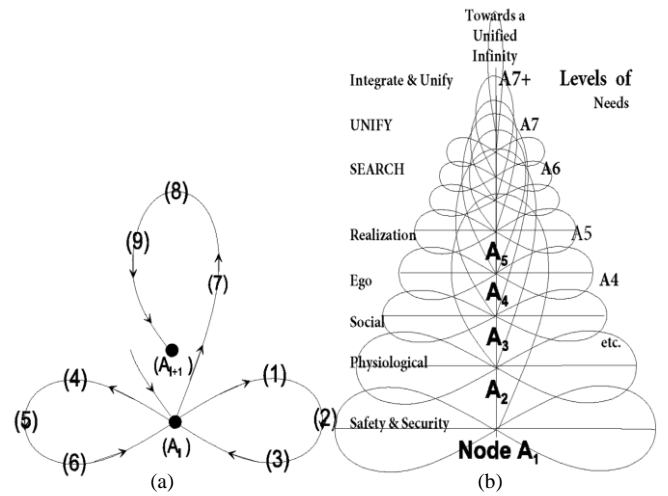


Fig. 6 Movement of lemniscates across need levels or layers of a need pyramid.

When the routine verb functions of a level ‘ i ’ need are inadequate the verb functions are elevated to a more intelligent level at $(i+1)$ or to any other higher level. In Figure 3b, the sequences of the process in the elevation of the lemniscates 1 through 7+ are shown.

The refined and acquired processes (*vf's*) involved are not automatic even though some of the necessary processes may be genetic. For example, bear cubs readily climb trees or conserve warmth in winter snows whereas the skill to catch fish in running streams is acquired. A certain amount of adaptive intelligence is appended to the genetic intelligence thus making the living skill evolve to be optimal. In the more evolved species, the genes trail the survival needs and greater leaning becomes necessary. This type of adaptation is most evident in the human species and more so in the knowledge workers in the information age. Adolescents’ preoccupation with mobile phones develops more easily than intellectual capacities to deploy the information to greater utility.

Perhaps the skill to learn is to learn to be selectively intelligent in what to learn. Especially when the Internet carries so much junk information, this discretionary learning is as important as intelligence itself. The observation holds for an individual or collective populous. Skills of this nature are more evident at the sixth and seventh layers of needs thus making the human species become both highly selective and extremely intelligent at the same time.

The shape of the lemniscates model tends to break at node A_i , moves into the adjoining layer (up for down), and ends in the target layer. In the new layer, the behavioral pattern tends to repeat itself to gratify a similar pattern of acceptable behavior. Finding acceptable behavior with minimal expenditure of energy becomes the goal. Unacceptable behavior needs additional resources and by and large, all species make such adjustments to continue to live for better (upward movement) or worse (downward movement).

Two-layer movement is shown in Figure 5a and the multi-layer movement is depicted in Figure 5b. The movements in Figure 5b can be a lifelong process of dedication and persistence. Most individuals stop at the intermediate layers and the personality growth freezes within that layer unless a change is triggered by internal motivation or external circumstance or both. In a positive feedback situation, the movement can be accelerated and rapidly making some positive contributors to society and human welfare. Conversely, with a downward slide of the lemniscates, some individuals can become thugs, thieves, villains, and members of Mafia.

D. Behavioral Stability

A certain amount of variation in behavior is tolerated within most societies and gross variations of the v_f 's or actions at any one of six nodes of Figures 3 need special treatment or adjustments on from other members of the society or community. Ideal societies and communities do not exist and the role intelligence at a collective level becomes necessary as of the role of individual adaptation and readjustment. National, communal and social problems and needs are handled by the appointed or elected official. An organized approach of the type depicted in the steps of the lemniscates in Figures 3. A detailed classification of the v_f 's or actions implemented over time gives rise to the organizational charts. Organizational management [4] thus becomes as individualistic as managing the health of an individual and organizational behavior [14] also needs to be stabilized to fall to lie within the range of acceptability of the legal, ethical, political, and financial environments.

The rules of micro- and macro-economics stabilize the internal and national behavior of Corporations and Nations for their financial stability. From human/social/ethical considerations, the movements of the lemniscates within and beyond layers of the Corporate and National needs and goals follow their depictions in Figures 5 and 6. The scatter plot individual corporations and nations are akin to scatter-plot (s) in Figure 4. Like individuals, corporations and nations come, exist, and die in a longer timeframe. Their ascension and deterioration are influenced by how just or how unjust their actions are matched to their needs and goals. In a truly immediate view of the socio-economic climate of this decade of 2020, corporations and nations need the monitoring and mentoring of their local and national verb functions (i.e., action that they undertake) that do enhance or deteriorate values and morals!

E. Integrated Patterns of Needs

When the pattern (1-9) is repeated for the lower six needs, Figure (6a) gets superposed six times over. Each figure is displaced vertically by one need level. In an ideal case, the nodes A_i all line up on a vertical axis. In reality, many variations and distortions of the combined figure are just as likely (see Figure 6b).

The need and migration pattern after the sixth need deserve special consideration. At this last and final stage that is perhaps reached at the highest stages of intellectual maturity and emotional development of individuals and corporations (e.g., the Microsoft Corporation). The vertical ascension into the seventh-level can be high and prolonged. The stage, when approached without normal human

shortcomings (like fear, jealousy, hate, deception, arrogance, and hypocrisy, can become an prison of no return. All human resources (including the last neuron in the brain) can be drawn into unification of all the infinite dimensions of a unified infinity. This rather rare phenomenon is seen in a few individuals (e.g., Gautama Buddha, Jesus Christ, St. John the Baptist) who have achieved a status of being almost supernatural.

The basic pattern embedded in Figure 6b remains the same as that shown in Figure 6a, but the size and shape of the pattern can change drastically from one individual to the next and with the level of maturity. These loops can also be recursive and modified every time they are revisited. But like human nature, these loops are cast in the neural nets of the brain and are hard to change radically. The progression of human behavior from early days to modern times can be traced by locating the height of the need hierarchy at any stage of evolution. If the modern human is most evolved, then it appears the mode of behavior can vary between the most rudimentary as the hunter-killer (in modern wars) to the most profound, patient, and perseverant as Mother Theresa, or Albert Schweitzer.

In the pattern shown in Figure 6b, an additional level can exist. Such needs at the (7)* level in human beings can exist. One can only guess at this need structure. There are people who would resort to extreme behavior (e.g., starve themselves to death, or enter a stage of willful coma) before their natural death, or even wantonly kill themselves) for a cause on the positive scale.

IV. SEARCH SPACE AT EACH LEVEL OF NEED

If there is a pyramid of needs, then there is a need frustum at every level. History has shown that the escape from boredom shown in Figure 6a does not always have to be vertical. A variation in the way in which any particular need is gratified also yields an aversion from boredom. This is a powerful venue for escaping from the routine of gratifying any given need in the same repetitious way. Without taking bold step in resolving the next higher-level need, many people vary the configuration of the loops within the same level of need.

The need space for any given need now constitutes a frustum as shown in Figure 5a, derived from the pyramid of needs. If the need pyramid is allowed to spin freely about the centerline of the triangle, a cone gets generated and a section of the cone forms the frustum. The loops start to have a three dimensional perspective. Hopping between cycles in the same frustum (e.g., changing category jobs, swapping partners, changing restaurants) offers relief from boredom but not progress. Hopping between frustums without a contemplated path of migration for the transfer of mental resources can become chaotic and cause intellectual fractals causing disorderly behavior.

Search gets ingrained in the resolution of needs and continues beyond the fifth-level, thus entering the search level (level 6) for solving a scientific, social, cultural, moral, or ethical issue rather than searching for personal gain. The human being thus gets drawn into society and culture beyond the "self" notions embodied in Freud's and Maslow's models. G. H. Mead [15] acknowledges the search in the sixth-level as the quest for the "whole" in his classic book *Mind, Self and Society*.

A. *Infinitely Large Search Space*

The semi-infinite space comes to light because of the innumerable ways to satisfy any particular need. The sevenfold increase takes place because there are seven levels of needs. However, there are fundamental differences. The society and culture provides streamlined ways of solving the issue of needs, especially at the lower levels. Restaurants, motels, residential complexes, and so on are numerous and widespread. The means of gratifying the higher-level needs can vary dramatically. Hence, the sevenfold increase in the search space follows an exponential law being limited to a few standard choices (accepted by the social and cultural norms) and then becoming innumerable for the higher-level needs (social, ego, realization, search and unification).

It is appropriate to note that human beings tend to subconsciously lean toward the means that maximize the expected gratification consistent with the resources expended. For this reason, the process of search is limited by the expected marginal gain. Individuals like organizations thus curtail the search and maximize the rewards. By the same token, almost every activity and behavior appears to become confined to the seven frustums of a human need structure.

The sevenfold semi-infinite search space may not be evident or attainable by a great majority of people who become overly content by the gratification of the needs at the third, fourth or fifth-levels. In any social setting, the need to be resourceful, optimal, and benevolent is felt by most leaders (e.g., Abraham Lincoln, George Washington, Thomas Jefferson) during their own era. The drive for the higher needs is a personal attribute even though the social rewards may be monumental. Historically, there are few who attain and master the search (sixth) and the unification (seventh) level search space unless they are genetically or circumstantially driven in this realm of thought.

V. TWO CONFLICTS IN PERSONALITY AND BEHAVIOR

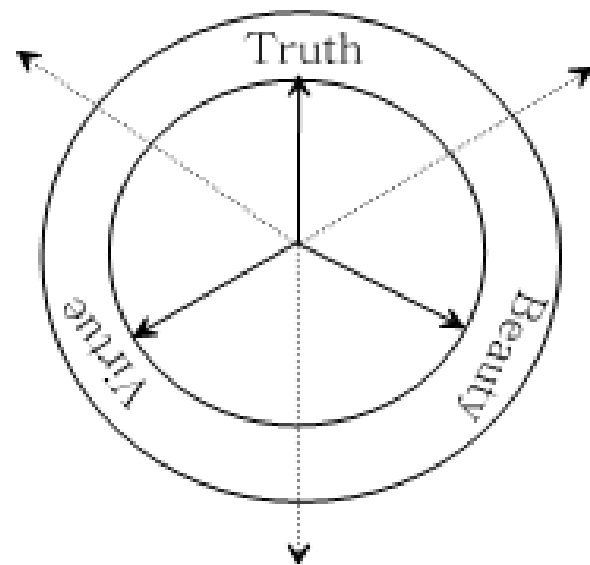
Individuals resolve their needs in different ways. It would be futile to attempt to standardize the micro-steps in need satisfaction for each individual. However, the guidelines go back to Aristotle and their reinforcement by Maslow.

Aristotle [16] suggested that there are two sides to the human nature: (1) the positive side⁵ (type-I) where truth, virtue, and beauty dominate the tendency and (2) the negative side⁶ (type-II) where deception, arrogance, and hypocrisy dominate. Maslow has written about “B-values” and built an array of fifteen attributes for such individuals. In order to merge the concepts of Aristotle and Maslow, and

⁵ There is a contextual overlap between age-old Aristotle’s type I classification of information-age nature and attributes of human beings who control and monitor the wisdom machine in a *positive* sense. In the modern age, Aristotle’s type I has *at least* two manifestations: type A (the philosopher, scholar, etc.; and type B (the pragmatic problem solver, scientist, etc.).

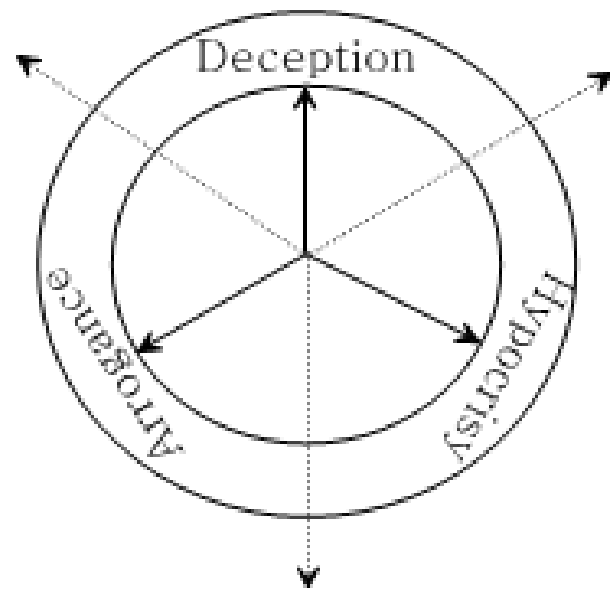
⁶ There is a contextual overlap between age-old Aristotle’s type II classification of Information-age nature and attributes of human beings who control and monitor the wisdom machine in a *negative* sense. In the modern age, Aristotle’s type II has *at least* two manifestations type C (the warmonger, the tyrant king, etc; and type D (the mobster, the thug, etc.).

make them applicable to the behavioral model (proposed in this chapter), we introduce the concepts of a phasor representation. These concepts are also presented in Chapter 13 of Reference [6].



Three Positive Phasors at T, V, and B

Fig 7a A positive (type I) phasor diagram where the pursuit of any need (1 through 7) also entails an innate personal tendency toward Truth, Virtue, and/or Beauty (TVB) with attributes shown in the outermost ring.



Three Negative Phasors at D, A, and H

Fig 7b A negative (type II) phasor diagram where the pursuit of any need (1 through 5) also entails an innate personal tendency toward Deception, Arrogance, and /or Hypocrisy (DAH) with attributes shown in the outermost ring.

Fig. 7 Tendencies of humans and their representations in a (r, θ) coordinate system indicating intensity and direction of the predisposition.

In this representation there two phasors: type I and type II. Both phasors are active as an individual traverses the cycle for each of the lower six levels of needs (i.e., physiological through the search). Each individual leaves a trail of phasor angles at every step in the resolution of needs. In essence, a character trail is left behind and a study

of the trail (on the computer) generates a personality signature of the individual. Much like a handwritten signature, the personality signature has a smooth and predictable pattern unless one person has numerous personalities and the modality of personality change is abrupt. The difference is that the personality signature is written only in deep folds of the mind.

A. The Signature of the Personality

The approach to build a database of the personality is to classify the needs (1 through 7, Figure 1b) and nine steps (Figure 6a) germane to each pattern of need satisfaction at each of the seven levels. The representation of the phasor angle from (+15 (+5 times 3) attributes to -15 (-5 times 3) attributes) according to Maslow, or +3 to -3, according to Aristotle) of the nature portrayed at each of the 63 (i.e., 7 times 9) discrete points follows. This 3-D space ($7 \times 9 \times 30$, for Maslow or $7 \times 9 \times 6$, for Aristotle), should provide a low-resolution portrayal of an individual's personality. In reality, the gradation of needs, the stages in satisfying the need, and the migration path can be many times more than the numbers 7 and 9 suggested here. The actual number in unimportant since the range of attributes and sub-attributes of need-objects in a computer can be quite large. Changes of personality and styles of behavior do not actually follow the Aristotle's or Maslow's guidelines. However, modern computer systems offer ample storage and memory to capture the many personality variations of very sophisticated or very primitive human beings.

We incorporate this concept into the behavioral model and the personality signature by taking a cross section of the lines in the diagram 6b. In fact, the lines and curves in Figure 6a and 6b, are not lines, but multi-string threads. The twist of the threads depicts the type-I and type-II phasor angles in the nature of the personality. The concept is depicted in Figure 7 according to Aristotle's model of conduct. There are only three (120 degrees i.e., $3 \times 120 = 360^\circ$) segments in each of the two phasor (types I and II) diagrams in Figures 7a and 7b. The coarse attributes are highlighted as Truth, Virtue, and Beauty for the type-I of the human personality and Deception, Arrogance, and Hypocrisy highlighted for the type-II of the human personality.

Over the last few decades, social scientists have become aware of the negative side of human personality. The classic thinker Erich Fromm has presented modes of behaviorism [17, 18] quite the opposite of his own findings in his earlier classic *The Art of Loving* [18]. Fromm (a psychoanalyst by profession) classifies these unhealthy personalities as receptive (takers), exploitive, hoarding, and marketing characters and they become segments of the DAH (see Figure 7b) circle. More recently, Noam Chomsky offers a similar insight in his book, *Distorted Morality* [20].

From a contemporary perspective, knowledge workers are beyond the models Freud, Maslow and even Fromm [21]. Modern humans need at least two more levels for the longing mind that cries to contribute to a society of which one is only a part. The search to be a pioneer continues. For the body, modern humans have the id (Freudian), an ego (Freudian), and a set of lower-level needs (physiological and safety—Maslow's need pyramid). For the mind, the

modern humans have a set of higher needs (the ego (Freudian), the social (or the Freudian superego) and realization (Maslow's need pyramid)).

Finally, the information, technology and knowledge driven human beings have two levels (search and unification) atop the models of Freud and Maslow that will form the basis of a seven-level personality. This model is complete basis for human behavior and is a model for the machine to impersonate a human. The complete human being with a body, mind (Freud and Maslow) and longing (soul by Jung; see also Crick [21]) is represented in this model. These two outermost levels of personality represented as sixth- and seventh-level needs, let the thoughtful, meditative, and contemplative individual leap into the realm of the unknown and beyond. The individual explores a little more into the outer reaches of human perceptions, after having gone into the cosmic space: in to the perceptual space of the mind. The evolution from Freudian three-layer model to the semi-infinite seven-plus layer model is depicted in Figure 1b.

B. Computational Signature of Personality

We have selected the two types (type-I and type II) attributes (Figure 7) to be tied to personality traits of human beings. The finer classification of Truth as honest, sincere, open, frank, and candid is preferred rather than reality, actuality or conformity to knowledge. In a sense, the dictionary of ideas becomes more comprehensive than the dictionary of words.

In Figure 7, the circles have three 120° segments pertaining to the TVB or DAH attributes of an individual's personality. Similarly, for the type-A phasor according to Maslow there are 15 (18° , i.e., $15 \times 18^\circ = 360^\circ$) segments in each of the two (types A and B) phasor diagrams. These two figures are not shown but they can be deduced from Figure 7.

The granularities of the three segments in the two circles of Figure 7 are not important since the individual can have any blending of TVB and/or DAH. Like the three primary colors (red, yellow and blue) can be blended to yield any shade or hue, the basic traits blend together to yield any character of a human being. Maslow's 15 type-I and type-II phasor classifications simply become one or more angular coordinates in the TVB or DAH (r, θ) coordinate system. It is interesting to note these numerical identifiers are dynamic but generally stable in healthy personalities but oscillate drastically in unstable personalities.

If a wisdom machine (WM) presented [21] has access to a worldwide knowledge bases of different personality and behavioral types, then an initial mapping of any particular individual may be accomplished based on the "action profile" of how that individual has resolved lower-level needs. It is possible to identify the saint-benevolent scientist/artist genius in the TVB space and the terrorist in the DHA space, with the full understanding that a genius terrorist and an idiot saint lie at the extremes of a normal distribution curve. There are six extremes (TVB and DAH) and six normal distribution curves (T to D, V to A, and B to H; D to T, A to V, and H to B), if not 18 ($= 2 \times 3 \times 3$) normal distribution curves for the basic personality variations according to the writings of Aristotle.

The number increases to 450 ($= 2 \times 15 \times 15$) normal distribution curves according to the writings of Maslow. The fine granularity that Maslow has indicated by his 15 shades of the type-A phasor ("I-Values," listed as truth, goodness, beauty, unity and transcendence, aliveness, uniqueness, perfection, justice, simplicity, richness, effortlessness, playfulness, self-sufficiency, and meaningfulness) and the 15 shades of the type-II phasor can be derived from the space encompassed within the 18 normal distribution curves from Aristotle's classification.

C. Oscillations of Behavior

Over time, variations in human and cultural behavior are to be expected. The level of individual maturity, the cultural evolution, the changes in social norms all influence the long-term migration in patterns of behavior. However, it is also possible to witness violent swings in attitudes and behavior (and even cultural outlook) due to strong forces of conflict such as wars, plagues, or famines. The movement does not have to be smooth. This mode of violent change is most obvious in conflict-ridden and unstable personalities and in nations going through revolutions such as the French, Chinese, and Russian Revolutions.

When order and rationality prevail, the process transition and migration are manageable and fall within the level of acceptance of society. From the days of Freud, conflict has been identified as the cause of instability and its resolution has been envisioned as a cure. In this chapter it is suggested that the rational and step-by-step (see steps 1–6, Figure 6a) approach in satisfaction of any need and then the migration (steps 7–9, in Figure 6a) to the satisfaction of the next need can be approached on a mathematical basis and by computer-assisted techniques rather than by the tools and techniques of modern psychiatry. When a machine is programmed to trace the pattern of behavior of any given child or individual, it is feasible for the machine to suggest a strategy that is consistent with social attitudes and venues and resolves the next stage in need satisfaction or progression to the next stage. Typical knowledge banks and Internet access may facilitate the most suitable if not an optimal guide to behavior at any stage in human life and in any cultural or social setting. Much like modern medicine, the solution can be tailored to individual needs. The gift of being graceful, charming, and highly intelligent in the satisfaction of any human need can be programmed. The guide to etiquette now becomes a computational process.

The basic premise of this approach is that all motivations tend to follow a personality profile and the machine, from the prior actions of the individual, learns this personality profile. The extrapolation of this profile onto other social and cultural settings relieves the anxiety and tension associated with facing an uncertain situation. Currently, electronic government and IT platforms assist nations and organizations by suggesting the best course of action in any given setting and a similar personalized decision support system can suggest how an individual can achieve his/her goals in everyday life quickly and optimally, thus avoiding oscillation or impertinence of unexpected social behavior.

VI. ETHICAL VALUES AND DESIRABLE CONDUCT

Ethical values are a reflection of the hidden goals the social entities hold. Not being immediately displayed, the

motives and goals need the interpretation of the actions undertaken. A breakdown of the six identifiable steps shown in Figures 2 and 3 in the gratification of a deficit need or the solution of any problem shapes the lemniscates over a given timeframe. A definitive period of observation, such as the four-year Presidential term, or four-year of college-term, a year of portfolio analysis, short and life resumes, etc.) for the term analysis by the movements, distortions, and deformation of the lemniscates is indicative of the desirable or undesirable conduct of individuals leaders rather than unethical, lying ones.

The problems are exaggerated by corrupt and unethical political officials who prolong the fall of the social values of Nations. A similar situation is documented by the behavior of corporate leaders in the decay and demise of corporations. A nonpolitical institution under the jurisdiction of the Supreme Court such a network of Computer, Knowledge, and Wisdom machines is suggested to monitor and monitor the geometry of these lemniscates. When the political appointment is supervised by ethical and judicious members, the probability of successive degradation of morals and ethics becomes small, though not eliminated. A robust and well-monitored institution (run by all the principles of Justice and the next higher ethical goal) and non-politically motivated self-interest groups may be a possible venue out of a crisis mode of Nations or a global viral cases such as the Asian Flue (1957-58) or the COVID 19 of the 2020.

VII. CONCLUSIONS

We present conceptual knowledge-based models of behavior of species much like the observation-based of the three-level human personality structure of Freud, or the five-layer need-pyramid of Maslow. Even though these models are not numerical like models for the flow of electrical currents and signals, they indicate how humans act and react in a healthy frame of mind (Freud) or how they behave depending on their immediate needs (Maslow). The model presented in this paper is indicative of how species and human solve their routine problems of everyday life, learn and intelligently, adapt their behavior based on laws of economics (Marshall), and maximize the marginal utility of the resources expended in resolving their needs.

The principle of design in computer software is included in separating the reusable routines and modules of behavior. Such modular behavior is invoked to attempt to solve larger and more obscure problems in creative combinations of "work-done" in the effort (vf) or their groups ($vf's$). The principle of application programming (or apps) is included in making the solution applicable in real-time and humanly feasible actions ($vf's$). The laws for the behavior guided by natural intelligence (NI) are deeper, longer-lasting than the observations based on artificial intelligence (AI), and this concept is made practical by intertwining wisdom besides with the knowledge learned from short-term intelligence presented in this paper.

The concepts of Shannon are included in trying to reduce the "selfie-noise" generated by self-interested humans and the self-interest groups (SIG's), even though it does not appear feasible to compute the signal to noise ratios as it is done in communication theory. The bit-error

rates though not computable are still indicative of the drifts in behavior over time for individuals and societies. Short-term corrections become possible by doctors and self-study groups for individuals and small groups whereas long-term corrections may be incorporated by the policymakers for groups, societies, and nations. In these situations the role of computers, networks, and the Internet to make these corrective steps effective and timely.

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