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Knowledge Development and Personality Evolution in the Post Intelligent Internet Era

Syed V. Ahamed
Professor Emeritus, Computer Science
City University of New York, New York, 10316
profahamed@gmail.com

***Abstract*—In this paper, the role of the knowledge processing capability of the mind and the concurrent development of the hosting personality development are presented. The theory is based on the fact the since conception and birth the seminal cells are confounded by their unique needs running throughout life. This structure of needs that surrounds all living species through infancy, adulthood through the final demise is irrevocable for all living species. This absolute commonality is the basis of life itself. The paper covers numerous disciplines such as computer science, digital communication systems, intelligent networks, knowledge science, natural, global and Artificial Intelligence, and behavioral sciences to include behavioral enhancement from internal motivation and external influences from Nature (such as the current COVID19 viral infections) and social injustices during war and dictatorships.**

The flow of information conforms to the motivational theories of Maslow, to the resulting behavioral modification based on the laws of economics that balance the effort expended in the change against the expected gains in the benefit received. The rationality of Marshall is intertwined with von Neumann's principle of economic behavior during risk aversion and profit maximization. The field of its application is in the behavioral science of human beings and the evolution of their personality during the lifetime.

The paper presents significant contributions in these disciplines and distills the most notable achievements in those directions. These achievements are integrated to suit the Internet age and Knowledge society of the 2020s. Also, it facilitates a positive personality to build and contribute to the ethics and values of humankind. The changes in technology, environment, and the society that modify behavioral patterns are incorporated by detailed schematics and graphics. It also points to human tendencies (laziness) that let the mind slip into a mind-trap that blocks the mind to "see" beyond their selfish interests. Finally, the paper helps curtails the recent unprecedented slides towards Wars, Occupation and Mafia-type tendencies of various politicians (*no's*) by conserving their activities to actions and convolutions (*vf*'s and *'*s*) in the positive (i.e., 6, 7 and 7+ regions) of an enhanced Need Pyramid. These two layers reside above the top of Maslow's Need pyramid and well within the goals of "Selflessness" preached by the ancient Greek philosophers such as Aristotle and Socrates and their recent Indian counterparts such as Gandhi and Tagore

Keywords*—*Knowledge, Wisdom, Digital Age, Internet, Computer and Communication Systems, Social Sciences, Human Needs, Behavior, Values, Ethics

I. INTRODUCTION

Human needs have been evolving since millennia. Concurrently, human behavior has evolved following the needs and their gratification. Existence and reality imply that certain crucial needs are satisfied at every moment of existence. The gratification of these needs leads to human behavior and what is needed for survival. This theme prevailed long before the advent of social scientists and behavioral theorists. Human needs have evolved with the human species. Motivation and behavior have followed subsequently.

Most inventions and innovations exist because they serve one or more individual or social needs. Such inventions have evolved and survived in society because they optimally serve some human need. Some machines (including systems) serve needs directly like telephones serving the communication need or indirectly like electrical generating plants serving the power requirements for appliances and applications. The driving force is firmly founded in the needs of humans or the needs of society. For this reason, we investigate the needs of the new machines that will prevail rather than machines that exploit a transient economic opportunity. Historically, the inventions that have withstood the test of time satisfy the most dominant (communication, transportation, agricultural, etc.) needs of human beings.

When the basis of breakthrough inventions is projected into the future, it is obvious that human needs are the primary driving force. For this reason, we look at the individual needs and how they have changed in light of the information age and the Internet. The information age offers higher productivity for individuals monitoring efficient machine-based robotic production lines, while the Internet offers global communication facilities. The synergy offers humans a greater amount of leisure time for introspection that brings out the best from individuals and that is to search and invent from a practical consideration or to search and unify from scientific and philosophic consideration.

The synergy between the computer-based information age and the high-speed dominated Internet has somewhat altered the script of human behavior over the last few decades. In modern times, most high school students are computer literate and surf the Internet as easily as adults can enter a conversation. The needs of the next generation may change marginally at the lower levels but the most innate and insidious needs that have evolved over millennia are not likely to be compromised quickly. In the rest of this chapter, we explore two such deeply seated needs (to search and to invent, and to search and to unify) that are not likely to go away because of the information age, the Internet, or both.

The expenditure of energy to function causes its depletion. It reduces the tendency to remain active indefinitely. A sense of balance between the extra expenditure of resources and the expected gain in the marginal utility that is thus derived curtails excessive effort in any given direction. The balance becomes global and a

sense of fairness and justice prompts most humans to be generous and positive based on gratification and peace. This Second Law of Microeconomics becomes the basis for the human race to progress in a positive direction.

In the other direction, when resources are limited, the conflict between self-interest and fairness starts to surface. The fears of the future sometimes dominate to obliterate the glory of being righteous in the past. Greed and negativity sets in. The first and second need levels from the Maslow‟s Need Pyramid [1] projected into the future, cast a grim shadow over the fourth and fifth levels of need-gratifications from the past. Fear of fear makes the insecure drown in greed, hate, and violence.

II. Role of Behavioral Sciences

A. Prior Contributions to Behavioral Scientists

1) Sigmund Freud

Freud [2] was one of the pioneering explorers of human behavior. Even though his perspective has been from the field of clinical medicine (psychiatry), the behavioral model proposed by him is based on the notion that the mind has three basic domains (id, ego, and superego). The Freudian model is based on functions the mind performs rather than the neural pathways in the brain. From a clinical consideration, Freud proposed the very convincing hypothesis that a harmonious blending of these three domains leads to normal behavior and a conflictive overlap of these domains leads to abnormal behavior. Even though modern psychiatry has come a long way from this rudimentary notion of Freud, the basic premise of unresolved conflict leading to abnormal behavior remains valid. Over the centuries, the conflict leading to severe modalities of behavior existed in humans, tribes, cultures, societies, and even nations. Modern organizations and nations display need-driven collective behavior and succumb to the effects of conflicts in resource allocation, egos, and even in opinions.

Regarding individual behavior and its manifestation, both are subject to genetic tendencies and environmental conditions, conditions that provide or block the means to satisfy the needs. Regarding collective behavior and attitude, both are also subject to the history and resources to satisfy the collective needs. Extremes of behavior, according to Freud, can still be linked to the severity of internal needs and the (internal and external) constraints blocking the satisfaction of such needs.

Simplistic as it may be, Freud's model offers a means to understand the rationale behind individual behavior. It is also applicable when dealing with issues at a collective level. The simple three-level model with ID, Ego, and Super-Ego introduced by Freud is a framework for dealing with more complex sets of issues of the workings of the mind, even though no one has seen the three domains of the mind.

2) Carl Jung

Carl Jung [3] brought a new twist to Freud's theories. A dimension of uncertainty is injected when the influence of the human soul and predictive dreams was included. Whereas Freudian concepts were based on the mind being predictable and rational, Jung retained that a part of the human mind is beyond rationality. Rather than considering the uncertainty that arises from randomness in the neural paths in the brain and nervous system of the individual, or the environmental conditions, Jung had extended his thoughts into faith as an abrupt jump.

B. Abraham Maslow's Unique Contributions

Maslow has discarded the clinical perspective of Freud, the notions behind the reasoning of Jung, and the transactional analysis of Berne. Maslow has taken are a bold new step in tying the needs of healthy human beings to their behavior via the factors that motivate them and society that provides the means to satisfy the needs. In a sense, the relationship between an individual and society (and environment) is implied in Maslow's model but it remains dominant from the individual's point of view. Among the various higher-level models for explaining behavior, Maslow's five-level model is widely accepted in corporate and social settings. It deals with the actions and interactions between highly rational individuals. Maslow studied a cross-section of successful and motivated people and suggested the five-level model shown in Figure 1, deal with human behavior. When the situation deals with microcosmic personal life issues the five-level model is adequate over short periods.

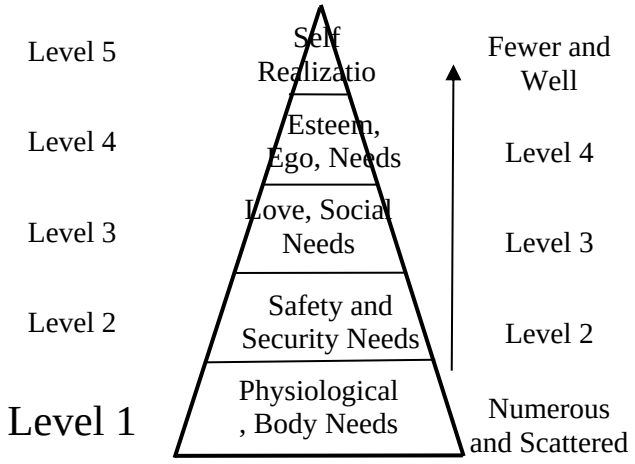

Fig. 1. Figure 1 Motivations come from human needs. Maslow has proposed a basic five-level motivational model based on human needs. This model is used most often to explain the motivations, aspirations, and organizational behavior of corporate employees and successful human beings.

However, Maslow's original writings are more profound. Whereas Jung had touched upon the existence and influence of the human soul, Maslow did not explicitly incorporate the spiritual dimension in his hierarchy of needs pyramid. Instead, he proposed that human beings have fifteen "B-Values," listed as truth, goodness, beauty, unity and transcendence, aliveness, uniqueness, perfection, justice, simplicity, richness, effortlessness, playfulness, self-sufficiency, and meaningfulness. In essence, Maslow was proposing that a human being is a more complex entity. In an obscure way, Maslow was hinting at the "spirit" of a human being. A contextual correlation emerges between the "spirit" that Maslow writes [1] about and what Carl Jung [3] has explicitly referred to as the "soul" of a human being [5]. This is a sharp contrast to the work of Watson in 1919 and the work of Skinner.

Human values can also be strong motivators, but Maslow did not emphasize them in a motivational cycle or as driving forces to be considered in a scientific vein. In

addition to the five-level needs, values could also make a difference. The model proposed by Maslow and his "B-values" [6] forms a strong foundation to further the model of human behavior. Unfortunately, Maslow's work does not address the possibility of adapting it to the computer environment and evolving a platform for behavioral intelligence (BI) proposed.

III. INADEQUACY OF EARLIER MODELS

The four models (Maslow, Freud, Jung, and Berne [1 through 4]) and the subsequent scenarios presented earlier do not adequately depict the behavior of modern human beings living in an information age, where lower-level needs are addressed adequately. The by-product of the industrial revolution and the computing era is leisure time. The high productivity within society and the resulting spare time for individuals forces a thoughtful human to probe further into his/herself and the society in which one lives. The models proposed earlier appear transparent and undermine the refinement of thought of the modern human being. These earlier models tend to be rudimentary for a detailed analysis of how a contemplative human being behaves given the tools and techniques, computers, and the Internet of modern society.

The social needs of Maslow's third level are based on motivations and behavior explaining how an individual derives the satisfaction from (or suffers at the hands of) society. However, an equally dominant issue is how society may benefit (or suffer) from the individual. Earlier models provide the basis for human behavior from an individual's perspective rather than from the perspective of a human being as a member of society, the environment, and the world community. This resulting equilibrium is dynamic, adaptive, and intelligent. Essentially, the world is not a collectivity of individuals, each driven by a need triangle, but a community of interdependent and interrelated individuals that make up the tribe, the community, society, the nation, and the world. This is, in turn, a dynamic process.

A. TWO ADDITIONAL LEVELS

For addressing needs beyond the individual and for the need to be introspective (resulting from the leisure), we present two additional levels atop Maslow's need triangle. The need within the *sixth-level* drives an individual *to search* for the best solution of needs from a family, group, tribal, social, communal, and/or environmental perspective. Such perspectives may be derived from the corporate responsibility and for this, the individual is duly compensated. However, it invokes a more fundamental need and that is a need to search. Need to search has infinite dimensions as the self-realization (i.e., level 5) need of Maslow. Modern human living through the information age, have time (the leisure) and means (the information age and the Internet) to search and surf almost indefinitely.

Ironically, it becomes a self-defeating proposition to search and never find that which is sought. Searching without a result becomes frustrating and futile. At this stage, we fall back on Maslow, who suggests that the need is temporarily extinguished even though it is not perfectly satisfied. In this context, the infinite searches at the sixth-level get partially satisfied by the expenditure of leisure and the Internet resources and the individual needs to unify all the (too many) search results. This leads to the *seventh* and final level of need in human beings. This is the need *to unify* the outcome of many searches (hundreds or millions (on the Internet)) into one generic answer, entity, principle, concept that can be searched and searched again and again, time after time, place after place but the conclusion remaining permanently (at least for the time being) valid. The outcome of the search for unification becomes a search in its own right to reach the elusive universal perfection. The need in humans to *unify* (almost) everything into *one* concept, however elusive (like superstring theory, elementary particles, relativity), becomes the final and the seventh-level of needs (Figure 2).

Once this level is penetrated, it starts to have the attribute of absoluteness, i.e., the following searches only confirm the process of unification in prior searches. In the scientific domain, such absolutes have been established. For example, the temperature of –273° C or 0° K is as illusive as *c*, the velocity of light, or the true value of *pi*, but the concept is established. Examples of absolute numbers (e.g., *e* (Euler's coefficient [8]), π (pi), $\hbar$ (Plank's constant, [9]), and even ∞ (infinity)), are also documented in the scientific literature.

At the seventh-level, the pyramid is not closed because individuals who get closer and closer to the ultimate goal of unification start to expend all the resources at their disposal to find the elusive (like nirvana, true love, perfection) attainment of having reached somewhere or some time without being able to backtrack. Energy to backtrack has been depleted in the last infinitesimal move forward. An elusive island of no return starts to be perceived. The writing of the greatest philosophers and preachers (Albert Einstein, Martin Luther King, Jr., Mohandas Gandhi, Albert Schweitzer, etc.) from the recent past appears to allude to this state of pure mental/spiritual activity. A sense of faith beyond reason prevails at this outer edge of mental activity and perhaps at this state of attainment, a feeling of detachment starts to set in. We suspect that at this very peak of the need pyramid the human being has little interest in finding a strategy to meet lower-level needs.

B. THE NEED TO SEARCH (SIXTH LEVEL)

Beyond Maslow's fifth-level self-realization remains another basic human need—to search; to optimally search for the best solution, concept, notion, principle, cause, a perception, and so on, in that particular society or environment. Above the traditional five-level triangle, this need stands out as an entity in its own right. If Marshall's laws of microeconomics were operative during prehistoric times, the hunter-collector-caveman would search for the best food that would offer the most return for the resources expended to obtain this bounty. Most animal species still prove Marshall's laws during their hunting strategy for prey.

This urge to search is generic enough to influence behavior while a human being seeks to satisfy all other needs, both lower and higher. This need to search becomes dominant at the higher levels of needs (ego, social, and realization). After the second-level needs are met, the urge to search and satisfy social needs (third level) becomes dominant with traits to also satisfy ego needs (fourth level) by choosing the best solution just to satisfy one's ego. Likewise, after third-level needs are met (satisfactorily), the urge to search and satisfy ego needs (fourth level) by choosing the best solution just to satisfy the realization needs (fifth level) becomes dominant, and so on. It is

evident that the search to satisfy one-level-up needs also paves the way to satisfy two-level-up needs. The law of optimally utilizing resources to satisfy the ith-level needs from the (i − 1)-level also assures that one satisfies the (i + 1) level needs as far as possible. This search for the allocation of resources for dual (i and i + 1 level) needs is indeed equivalent to Marshall's second law for maximizing the utility function.

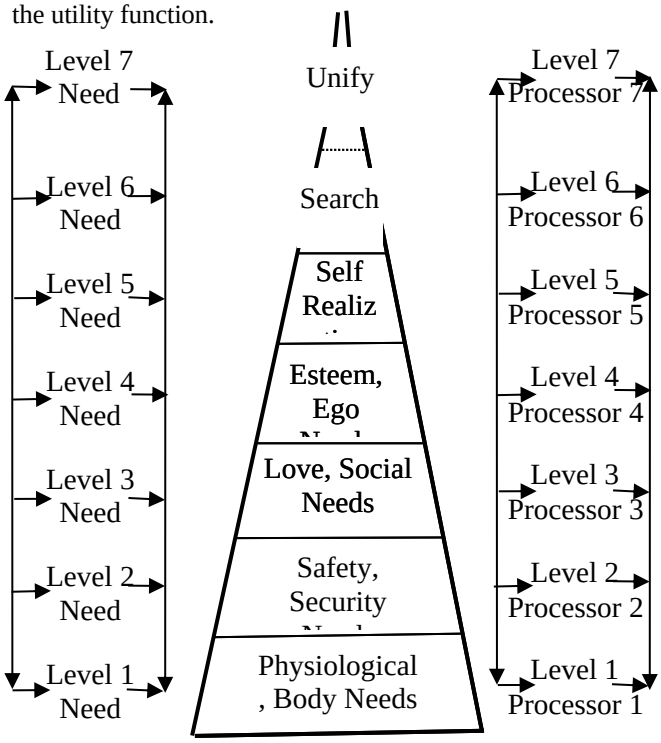

Fig. 2. Enhanced need hierarchy that addresses all the needs of a modern, thoughtful human being living in the information/Internet age. These include the need to search (for perfection, optimality, invention, etc.) at the sixth-level and the need to unify all the conclusions of all the searches, including one's search under one basic umbrella of universal wisdom or knowledge at the seventh level. At first glance, a hierarchy of special-purpose processors connected in a dual bus configuration starts to form the basis of a behaviorally intelligent platform to imitate the human need pyramid.

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In some cases, the search to satisfy i^{th} need can invoke a new approach to the (i − 1) need. This multilevel need satisfaction can be directed up or down the need hierarchy. There are two major implications. *First*, the search for optimality is an innate human tendency fundamental to behavior. *Second*, Marshall's first (marginal cost equals marginal gain) and second (maximization of the utility function) laws of economics dominate human behavior. Through the evolution of the human species, these laws have prevailed. But now, as human thought gets more refined, these laws can become more formalized and then can be incorporated into computer software and then into hardware implementation of a behaviorally intelligent machine.

From a scientific perspective, the urge to search has led to some very important findings: Einstein's correlation between space and time; Einstein's correction to Newton's laws given the finite velocity of light; Maxwell's search to generalize the findings of Ampere, Galvani, Oersted, and Gauss; and Edison's search for the right material for the filament of electric light. These are examples of the search at work on an individual level. The search for elementary particles in accelerators; the string theorist's search to generalize the laws of quantum mechanics at a cosmic level; the search of new galaxies in the universe; and the search for generic drugs in the pharmaceutical industry are examples of the search process at-work in organizational circles.

Poets have practiced this intellectual ordeal numerous times. Great writers like Emily Bronte (*Wuthering Heights*), Omar Khayyam (*Rubiyat*), Charlotte Bronte (*Jane Eyre*), Rabindranath Tagore (*Gitanjali*), and Matthew Arnold (*Dover Beach*) and great artists, (like Picasso, Michelangelo, and Rembrandt) portray the legacy of their searches and create beyond the obvious. Their writings and works of art carry their search and longing for an ultimate, infallible theme, an immortal concept, or an idea. Along the way, in their struggle, to deal with the abstract, their contributions become classic. Philosophers have pushed the limits of human thought in their search for possibilities beyond the constraints of society. The exploration of space is to seek (search) the unknown skies and explore the outer galaxies. When the search gets too directed and confined, inventions, and masterpieces result. When a sense of freedom rules the search, concepts (velocity of light, gravity, absoluteness of –273°C, etc.), wisdom (Buddha's Enlightenment, Gandhi's nonviolence, Lincoln's antislavery, Schweitzer's reverence for life, etc.) and classic theories (relativity, Heisenberg's uncertainty principle, superstring theory, etc.) can emerge. The boundary between sixth-level and seventh-level needs starts to become vague, even though the search to unify is distinct from the search to solve a real or an abstract problem.

C. THE NEED TO UNIFY (SEVENTH LEVEL)

Searching in the immediate discipline or neighborhood of the problem and in the context of solving that particular problem falls in the domain of sixth-level needs. Managers use this approach of "bounded reality", [11–13], and "local search" in organizational learning [14], in solving an overwhelming number of routine problems. These approaches— called "limited and local search" —offers a significant way of taking care of immediate problems confronting an individual, an entity, a corporation, or even a nation.

The expanded or "global search" seeks to unify the solutions of individuals (colleagues, scientists, or the same individual at different times, etc.) into one universal framework. This search can be quite colossal, leading to a whole new way of look at the universe (e.g., superstring

theory, the basic building blocks of human genes, or the tiniest component that exists in the universe, etc.). The nature and extent of this search lead to conceptual revolutions and belongs to the seventh-level of needs that push individuals to seek an all-dimensional infinity.

In the context of this book, this concept is important. If machines were built to serve human needs, the newer architectures should be built to address *all* needs of human beings. In the modern days, we find tools, gadgets, computers, and network systems to address our lower level (Maslow's levels, 1–4) needs adequately. At the fifth, sixth, and seventh levels, machines seeking wisdom from information [15] are documented. We do not suggest that there are machines that address the spiritual and virtue needs of human beings. We propose that such needs (to seek the unknown, to explore the stars, "to go where no one has gone before", etc.) do exist (at the sixth and seventh levels). Furthermore, we propose a crude mathematical way in which a human being approaches their solution. The proposed model is incomplete but a first attempt is to define a direction that unifies all dimensions (including the 11 dimensions proposed by string theorists) of human thought and that reaches a stage of absolute knowledge (if it is possible).

Searching for abstract goals at different times and in different settings will invariably lead to different results. These goals can be problem solutions, concepts, notions, principles, causes, or even divine perceptions. In essence, the last step toward consolidating the results of the search(es) is to unify the findings under one ideal, concept, notion, or principle. Whereas the sixth level motivates the process of searching, the seventh level need is finding and defining the common umbrella under which all results can be neatly stacked. The need to search for the unified order in the universe becomes all too consuming for a human being.

The sixth- and seventh- needs can take a lifetime to fulfill. Whereas the search (sixth level) is an interactive process with the environment, the abstraction of the generic underlying principle (seventh level) is a very personal process. This personal contribution unifies all the findings of a large number of researchers over a prolonged time. It is a painstakingly cumulative and integrative process. Einstein's extraordinary need to search and generalize his special theory of relativity; Poynting's [16] need to search and formulate a unified field theory integrating the electric and the magnetic field energies during EM field propagation; the superstring theorists who are still searching for ways to integrate the work of Einstein and Heisenberg all bear testimony that the need to research all previous concepts into a few laws or principles that drive the whole universe. The search for a solution that leads to an invention, a work of art, a verse of poetry, or a symphony of songs, fall under the sixth-level needs. The unification of all similar human searches into one common universal or super-universal theme falls under seventh-level needs. It is easy to see that at this stage of nirvana there are no neurons to spare leaving no way to backtrack.

From a computational perspective, when a programmer forces a machine to search for a value of *pi* beyond the limits of the numerical processor unit (NPU), the machine enters an indefinite loop, deciding between two values separated by the limit of precision in the NPU. For the human being, the thought process at the seventh-level claims all the resources of the mind until the last neuron in the brain is left in a stage of indecision. It is unknown to us if such a stage is achievable or can be achieved.

Marshall's laws of economics have no room at the seventh level, even though they monitor human behavior at the lower levels. All the neurons in the brain limit the thought and satisfaction of this seventh-level need leaving no resources to be allocated for maximizing the utility function (Marshall's second law of Economics, see footnote 1). If a human being reaches this stage of being so totally consumed in seeking the infinite, then there is no mental energy to spare. To avoid this internal deadlock, it would be wise to become aware of the law of diminishing returns[1] during the allocation of mental resources. It appears to us that the only path toward approaching this stage is by purity, perfection, and optimality in reaching the goal to unify. Anything less, (e.g., greed, selfishness, wickedness) is an insurmountable roadblock to the allocation of all (or an extremely high proportion of) the resources to integrate and to unify.

In synergy with current times to build a reasonably accurate model of behavior, one cannot choose to ignore that there is a negative side to human behavior such as deception, arrogance, and hypocrisy. Whereas philosophers of the past have casually mentioned and dismissed the existence of these negative traits, we propose to include these negative traits in the daily behavior of human beings as they go about finding means to satisfy their needs. The needs remain the same but the mode of operation migrates over from type A (positive) to type B (negative) making the behavioral model complete.

D. MODEL OF HUMAN BEHAVIOR

At a quantum level [17], human behavior is as predictive as the movement of an electron. However, at a macroscopic or gross level, the behavior is obvious and predictable. Response to physical threats and danger are genetically programmed by subconscious reflexive actions. The reflex to withdraw from a fire, the automatic shrinking of the pupil upon exposure to very bright light, or the quick response during a fall becomes automatic. In the same vein, response to hunger, thirst, and pain (first level) is also predictable. As the level of need starts to increase, the responses diverge but the theme is to satisfy the need consistent with social norms. In this section, we build a model for the behavior as human beings attempt to gratify their individual (or even collective) needs.

1) Repeated Habits and Behavior

The "force of habit" is a precursor of behavior. The direction depends on the direction of the cultivated habit and the change in behavior depends on the intensity of force and the duration over which the habit is repeated. In a sense, the effort or "work done" (= force times distance) becomes proportional to the change of behavior. Human behavior can change quickly and abruptly when the external conditions change abruptly. Typical examples are wars, Depressions, Tsunamis', epidemics, AIDS, Ebola, viral infections (COVID19 of 2020), etc. When grave danger is imminent, radical behavioral changes can be expected.

[1] The law of diminishing returns is borrowed from the theory of production documented in W. J. Spillman and E. Lang's book, *The Law of Diminishing Returns*, published in 1924. See also *The Columbia Encyclopedia*, Sixth Ed. 2001-2005.

Fear, anxiety, and aggression get triggered leading to a downward slid from any level (i) to (i-1) as reported on most media around the world.

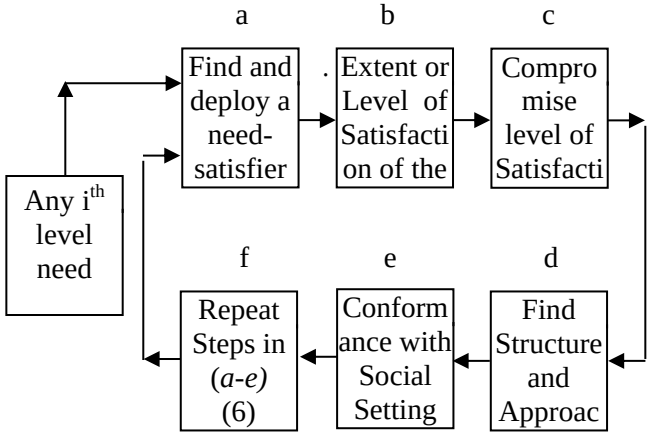


Fig. 3A Six-stage (a through f) behavioral approach involved in the satisfaction of any i th-level need; i ranges from 1 to 7 in the seven-level need structure of a human being

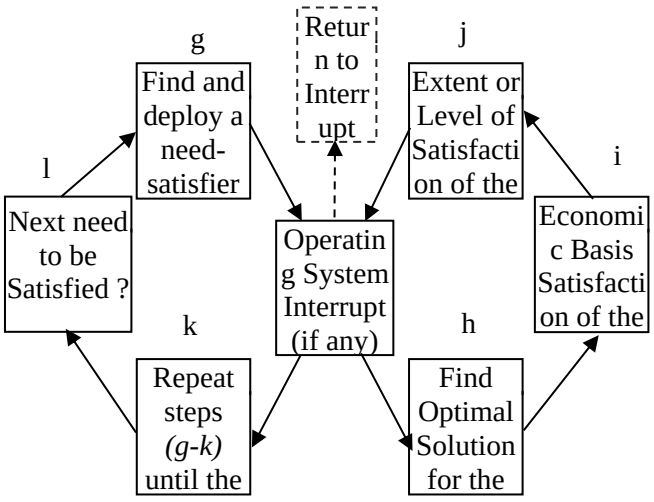
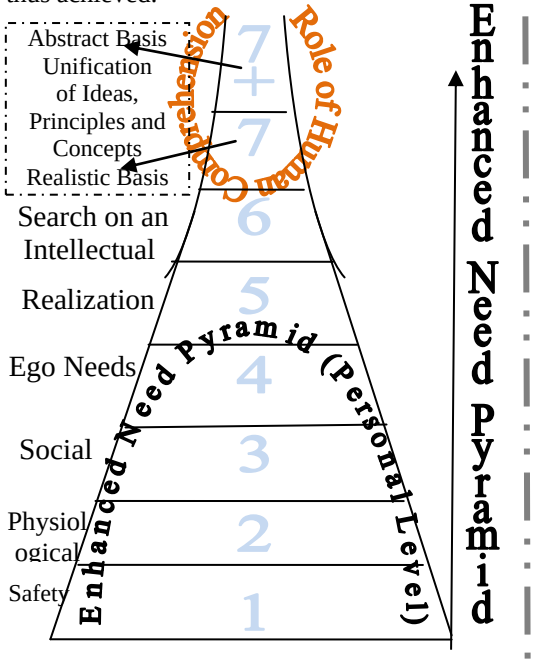


Fig. 3b A seven-step flowchart for a behavioral VLSI chip for processes involved in the satisfaction of all outstanding needs to imitate the human behavior in solving any i th level need shown in Figure 3a.

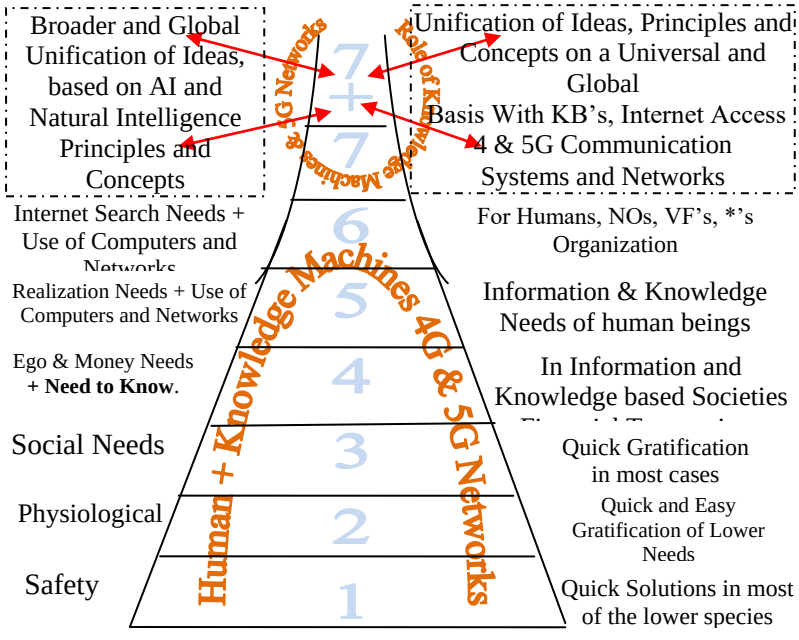
This pattern of behavior is the mode to make life feasible for any species. In the lower species, the level of needs is generally limited to the three or four levels, whereas human beings may have all the seven (7 and even 7+) levels to satisfy the mind (and the soul). The attainment of any being is perhaps a measure of how optimally these needs are gratified at the highest (7 and 7+) levels of needs for the individual and then for the entire humankind. In the scientific domain, the level gets saturated by the unifying the principles and concepts of science and technology at a local level; in the knowledge domain, the level gets saturated at the 7 and 7+ levels for the whole of humankind, species, environment, and Nature. A sense of long-term stability is thus achieved.

Over the evolution of species, the habits are developed to gratify the needs; the order of deficit needs during any interval of time activates the habit to gratify that particular need. Thus, the behavior is dictated by the Need structure. In the lower species, the lower needs (Levels 1 and 2 and 3 in Fig. 2) of the pyramid dictate their behavior. In the human species, the needs at Levels 3, 4, and 5 (Maslow) and Levels (Fig. 2) 3 through 7, dominate human behavior provided the needs at the lower level are satisfies up to a reasonable level of gratification.

To program a computer to imitate behavior, we present two flow-charts in Fig. 3. Fig. 3a represents the repetitive task in the pattern of behavior and Fig. 3b represents the computational pattern that can be programmed.



(a) Basic Human Needs Prior to Internet Era Enhanced Maslow's Need Hierarchy & Intellectual Activity



(b) Expanded Human Needs in the Internet Era with Global Access to Knowledge Bases (KB's), Internet Access to Local, Community, National and International Bases with 4G and 5G Communication Networks.

Fig. 4 Enhancement of the Needs ($n_e \rightarrow N_e$) from the normal human intellectual levels shown in (a) to much higher and broader and universal and global levels shown in (b). These enhanced needs implies the use of more and more sophisticated tools.

2) Satisfaction of Needs

If the need triangle has seven (or even five) levels, then the innate tendency is to address the lowest level (say, level *i*) needs first and then proceed to solve the next higher-level need. Even though it can be stated simply, the mind follows distinct patterns as follows:

(1) accomplishing and securing the means to satisfy any need in any i^{th} level,

(2) in being satisfied with the current need,

(3) in compromising if satisfaction of the j^{th} need at the i^{th} level is not perfect,

(4) in understanding the social structure that provides the means to satisfy the i^{th} level need,

(5) in conforming to the social structure to gain (or earn) the means to satisfy a need, and finally

(6) in repeatedly traversing of the loop (*a*) through (*f*) as far as the need is basic and recurring. The pattern is shown in Figure 3a as a self-propagating flowchart as long as the need persists

The six discrete steps of Figure 3a are rearranged slightly to make a programmable flowchart follow the contours of the need hierarchy. A transformed figure is shown in Figure 3b. 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. The expenditure of resources is minimized and the need satisfaction is maximized (based on Marshall's law to maximize marginal utility).

IV. Human Needs And Personality

A. Need Pyramids and Human Activity

Need pyramids have become higher as humans have evolved. From Freud to Maslow, the handling of such needs has ranged from psychoanalysis in rebalancing Id, Ego, and Superego to finding the most scientific Self Realization needs. The VLSI, computer, communication industries had changed the need gratification algorithms during the 1980s and 1990. The dramatic impact of the Cellular and Internet Technologies, and further, the successive introduction of 4th and 5th Generation Networks has the most profound impact. Access to well-organized knowledge that becomes available in real-time is the catalyst that has changed human behavior. A graphical representation of one such effect of the change from the pre-Internet era to the post-Internet era is presented in two Figures 4a and 4b respectively.

B. Need Gratification and Knowledge Generation

The generation of an incremental element of knowledge Δk_k is formed by a noun object n_i performing an action v_j in a structured convolution *. Similar elements of knowledge are formed by other modes of human actions such as $n_i \leftrightarrow *$, $* \leftrightarrow v_j$, etc. Such Δk_k are generated many millions of times during the daily lives of human beings and most of such knowledge elements are trivial. However, such elements can be systematically assembled in an orderly fashion to a general more relevant, and a large structure of significant knowledge.

C. Convergent Mental Space for Problem-Solving in All Life Forms

Problems arise unwittingly and unexpectedly. The solution lies in the individual intelligence bonded to the genetic and acquired intelligence. Artificial intelligence may become a part of the acquired intelligence. However not all the aspects of AI become applicable to problem-solving but natural adaptability generates a human action flowchart to deal with the real-time solution(s).

The role of pattern recognition in need gratification and knowledge generation can be readily identified in linking which objects (*n's*), what actions (*v's*), and their convolutions (*'s) to the needs and its level of gratification. The subsequent knowledge generated is also linked to the need, its gratification, and its level. The roles of intelligent agents and computer vision are not obvious. The resulting knowledge generated is reused in solving similar problems. When problem-solving and the *n's*, *v's*, and *'s are also linked a step in the solution, and a strategy is developed to solve other or similar problems. Lineages and linkages are learned in computer systems and deployed till a new methodology is designed and verified for a general class of problems. In practice, the knowledge is retained and documented as possible approaches that be effectively subdivided and redeployed to construct larger knowledge trees for larger problems.

D. Generic Pattern of Elemental Knowledge (Δk_k) Generation

Human actions and knowledge are tied intricately. The generation of new knowledge elements (or modules), Δk_k is depicted in Figure 5. These *elements* are generated many millions of time during the daily lives of human beings and most elements are trivial. However, such elements are systematically assembled in an orderly fashion to general more relevant and large structure of significant knowledge.

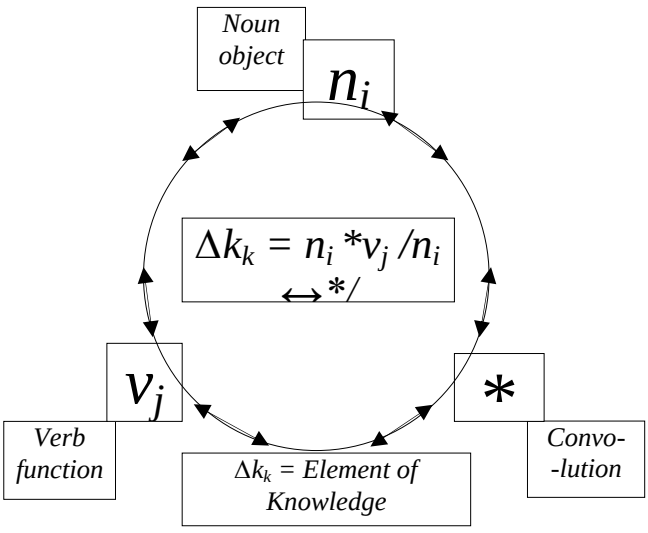


Fig. 5 The generation of an incremental element of knowledge Δk_k formed by a noun object ni performing an action vj in a structured convolution *. Similar elements of knowledge are formed by other modes such ni ↔ *, * ↔ vj, etc.

V. NEED PYRAMIDS, MENTAL SPACES, AND SPIRAL BOUNDARIES

A. *Convergent and Divergent Mental Spaces to Reshape Behavior*

Need pyramids and mental spaces are highly personal. Unlike fingerprints, individuals evolve their needs and priorities over their lifetimes. Following personalized needs, mental spaces evolve and become retrofitted to the needs. At the lower levels of needs (Levels 1 and 2 i., e., Safety, Physiological needs (shown in Figure 4)) genetic code of the species takes over behavior (such as reflex actions and physical protection). The corresponding mental space to gratify such needs also evolves in conjunction or by an allocation of time and energy to resolve these needs. At the middle levels, discretion, training, and intelligence personalize the mental spaces. At the highest levels, reflection and contemplation dominate the allocation and structure of mental spaces.

In a sense, needs, mental spaces, and their virtual boundaries follow a sequential path as the human being grows, and matures. It closely follows the second half (from Knowledge (K), Wisdom (W), and Concept (C) onto Ethics (E) and Social Progress (SP)) of the Knowledge trail [2] [see Reference 18]. A trail of mental development is an unending personal journey that can get curtailed by the behavioral traits of the individual before it reaches higher levels. At the 7+ layer (see Figure 4) the options for the choice of n, v and * become indefinitely large but the mental space gets confined to neural paths and personality attributes of the individual

The boundaries between the mental spaces are not strictly or scientifically structured. Events, circumstances, and social and environmental conditions shape and configure them. Like the flow of the wind or the ocean waves, mental spaces occupy the mind. Sometimes calm and sometimes turbulent, human behavior that loosely fits the mental spaces changes within limits and bounds in most civilized societies.

B. *Evolution of Human Personality Based on Higher Needs*

Personality is based on repeated behavioral patterns. The "force of habit" invokes reflex behavior unless it is reshaped by concerted rethinking, and this is time-intensive. Breaking of a habit becomes time and energy-intensive. Again, the "force of habit" can make too many humans too lazy to rethink!

In a sense, a large segment of any population of any species tends to favor no action over any action. Further, only a smaller segment of the remaining segment favor positive action over any action. This rather dismal attitude makes positive changes towards a more evolved positive personality reserved to those who have (by the "force of their positive habit") thought and energy to dedicate towards a pristine purity at a personal level and the betterment of humanity, environment, and the nation at a global level. Further, this innate feature of the chosen few tends to resist the negative slide into the decay of the mind, self, and society.

A total double converse of this scenario is equally true. A larger percentage of any population of any species tends to slide into a downward tailspin faster into decay, dismay, and even death dragging a larger percentage with them. Sometimes this form of double (COVID) virus creeps into the personalities of politicians who drag a populous, a nation, and a society into dire tendencies. Such double converse thrives well in Mafia leaders unless it is resisted and even eradicated by those (few) individuals with a double drive in the positive direction eluded earlier in this section.

At an individual level, the positively motivated human beings direct their time and energies towards their innermost selves and raise the level of thought, deeds and action (*v's*) towards gratifying their need at the 6, 7, and 7+ layers depicted in Figure 4. This migration of their collective personality is shown in Figures 5.

At a deep center of their minds they reach an infinite space of Time, Energy and Light (i.e. Knowledge ($K=\Sigma\Delta k_k$, see Figure 5), Wisdom ($W=$ *the best of* ΣK), Concept ($C=$ *the best of* ΣW) and Ethics ($E=$ *the best of* ΣC) shown as nodes 4, 5, 6, and 7 of the Knowledge Trail [18]) at the highest level 7+ level. Being human, their time and energies are limited to their lifetime and physiology. Nevertheless, such gifted human beings concentrate their deeds (*v's*) towards virtue and social betterment. In total dedication, they remove themselves from the evil of greed, deceit, and aggression towards other humans and nations. Their personalities become beacons to take others from darkness into the light of their self-made personalities.

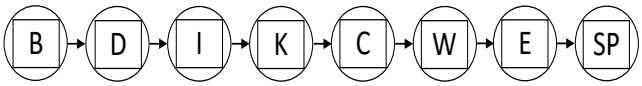
The changes in behavior generally are slow and perhaps take many years to occur. The effect of time in changing the personality of X is implied even though solving the problem may need immediate attention. The diagram offers a clue to the infinitely many variations that offer in society. Further, it also explains how the same individual X can exhibit different behaviors at two different times. The normality of behavior implies that these changes in behavior be controlled, rational, and acceptable. Uncontrolled, sudden, unexpected, and irrational changes become an indication of an unstable personality of X.

A generation of the knowledge element. $\Delta K12$ (see Figure 6) occurs

$$(\Delta K12) = N1 * \rightarrow *V12 \rightarrow N2$$

when X (i.e., *N1*) forms a function $N1 \rightarrow *V12 \rightarrow N2$ directed toward *N2* (in this case all the "others") in the society, is indicative of personality disorders of X. Sigmund Freud in his original papers has commented that the unbalance between Super-ego, Ego and Id [2] is the primary reason for personality disorder of individuals.

[2] A knowledge trail is a simple 8 node representing the sequential movement within or of the society from binary bits (B) to ethics to social progress and responsibility for the knowledge workers.



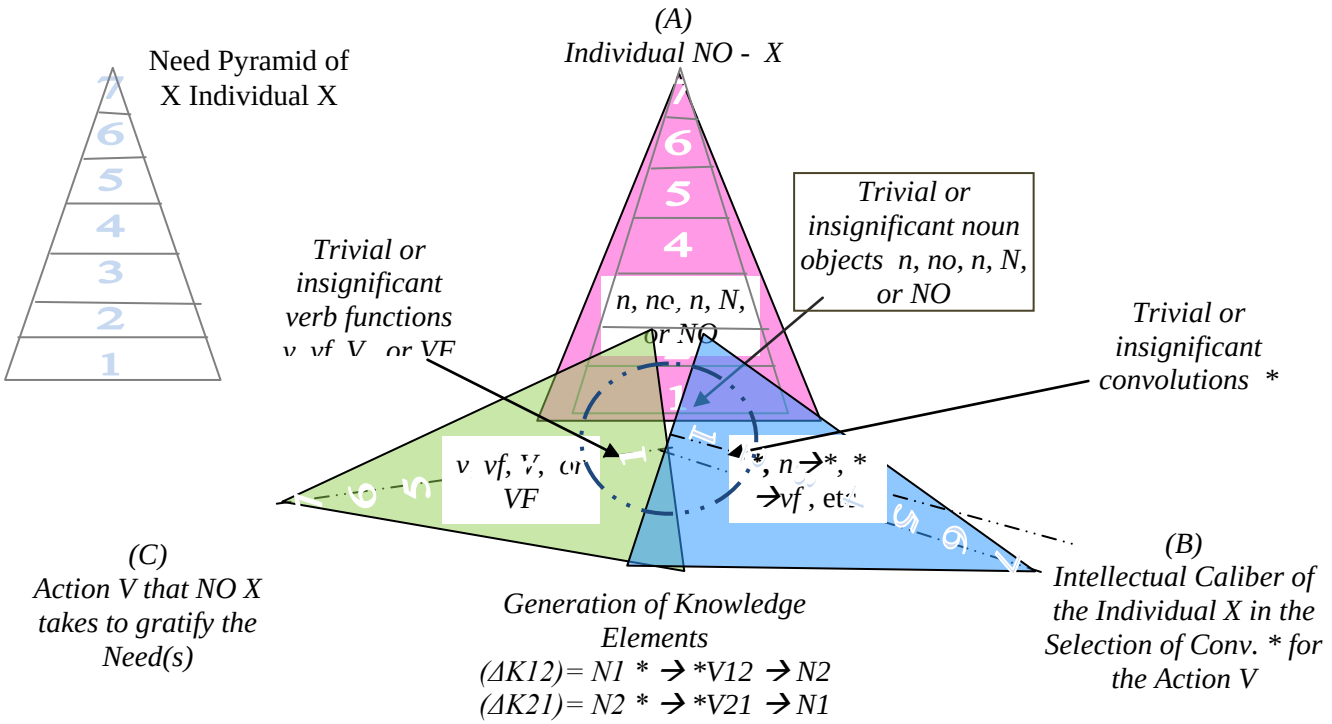
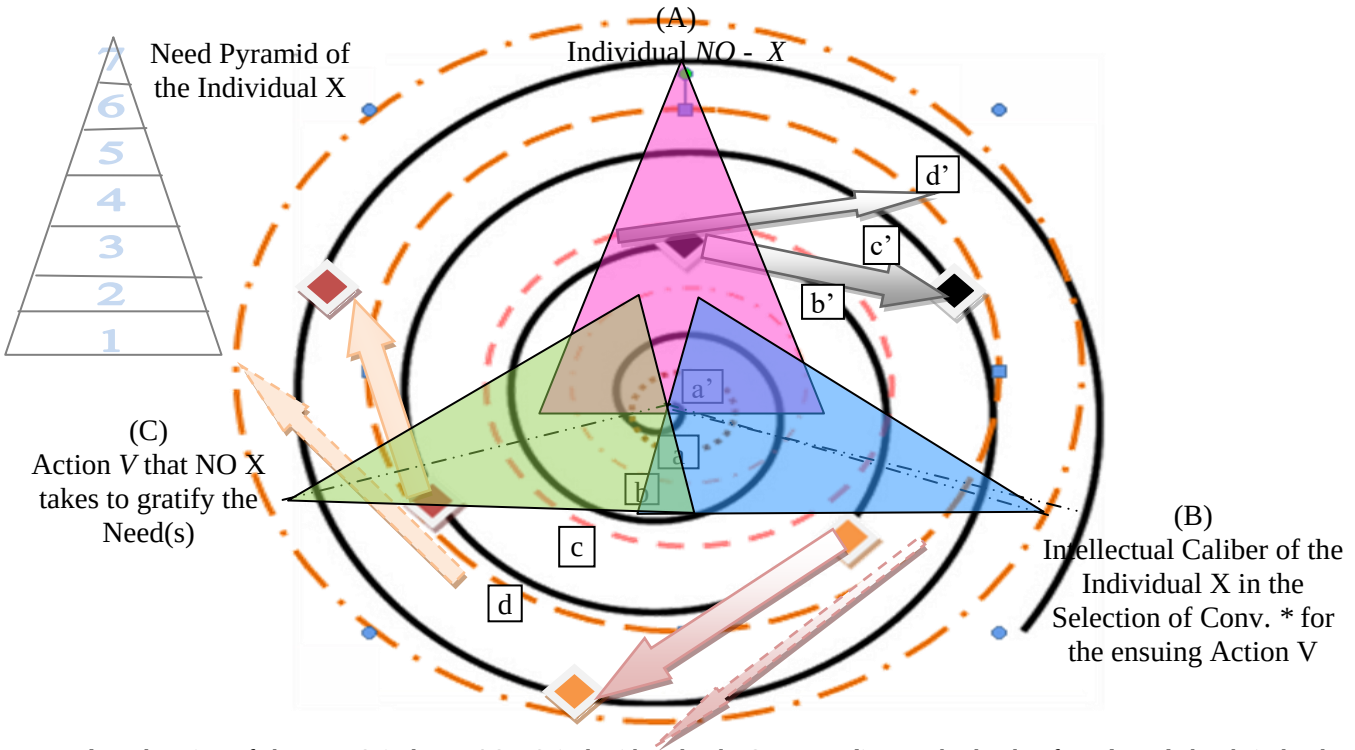


Fig. 6 The generation of an incremental element of knowledge Δk_{12} formed by a noun object n_1 performing an action v_j in a structured convolution *. Similar elements of knowledge are formed by other modes such $n_1 \leftrightarrow *$, $* \leftrightarrow v_{12}$, etc. Such Δk_{12} are generated many millions of time during the daily lives of human beings and most elements are trivial.



Note and Explanation of the Two Spirals: BLACK Spiral with 5 levels Corresponding to the levels of needs and the their levels of sophistication of any individual Noun Object (NO) – X, shown in Box A. The Brown Spiral and the block arrows indicate the movements of the human behavior changes from an ith level to a higher (i+1) th layer in gratifying the needs. The higher level of behavior offers a more desirable (universal and acceptable) approach to any problem solving.

Fig. 7 Effects of time in the evolution of behavior of an individual (X, see box A in this Figure, also see Figure 6). The block arrows indicate the movement that X is using the noun-objects, no's, from a higher level to gratify the personal needs and the verb-function, vf's (and their convolutions, *'s) from a lower level. Such a change can indicate that X is reaching out to a higher level. Conversely, if the directions of these block arrows is reverse, it starts to indicate that the personality of X is reverting to lower level. Such presses occur when X moves to hostile and unknown environments, due to aging, etc. The behavior patterns start to become abnormal.

The changes in behavior generally are slow and perhaps take many years to occur. The effect of time in changing the personality of X is implied even though solving the problem may need immediate attention. The diagram offers a clue to the infinitely many variations that offer in society. Further, it also explains how the same individual X can exhibit different behaviors at two different times. The normality of behavior implies that these changes in behavior be controlled, rational, and acceptable. Uncontrolled, sudden, unexpected, and irrational changes become an indication of an unstable personality of X.

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C. From Mindless (Θ, A Self-Centered Zero) to Mindful (8, a top-Open Vertical Infinity)

Mindlessness is a state of complete indulgence in selfish desires; it is a virtual trap that entirely consumes the body, mind, and soul of the life of an individual X (Figure 7). Such individuals have come and gone without leaving a trace of their existence. A living death encircles their life and life becomes isolation of death. This state is symbolized as Θ and represents a self-centered zero. Like micro-dinosaurs, such organisms live at the lowest levels (see Figure 4a) for gratifying their needs

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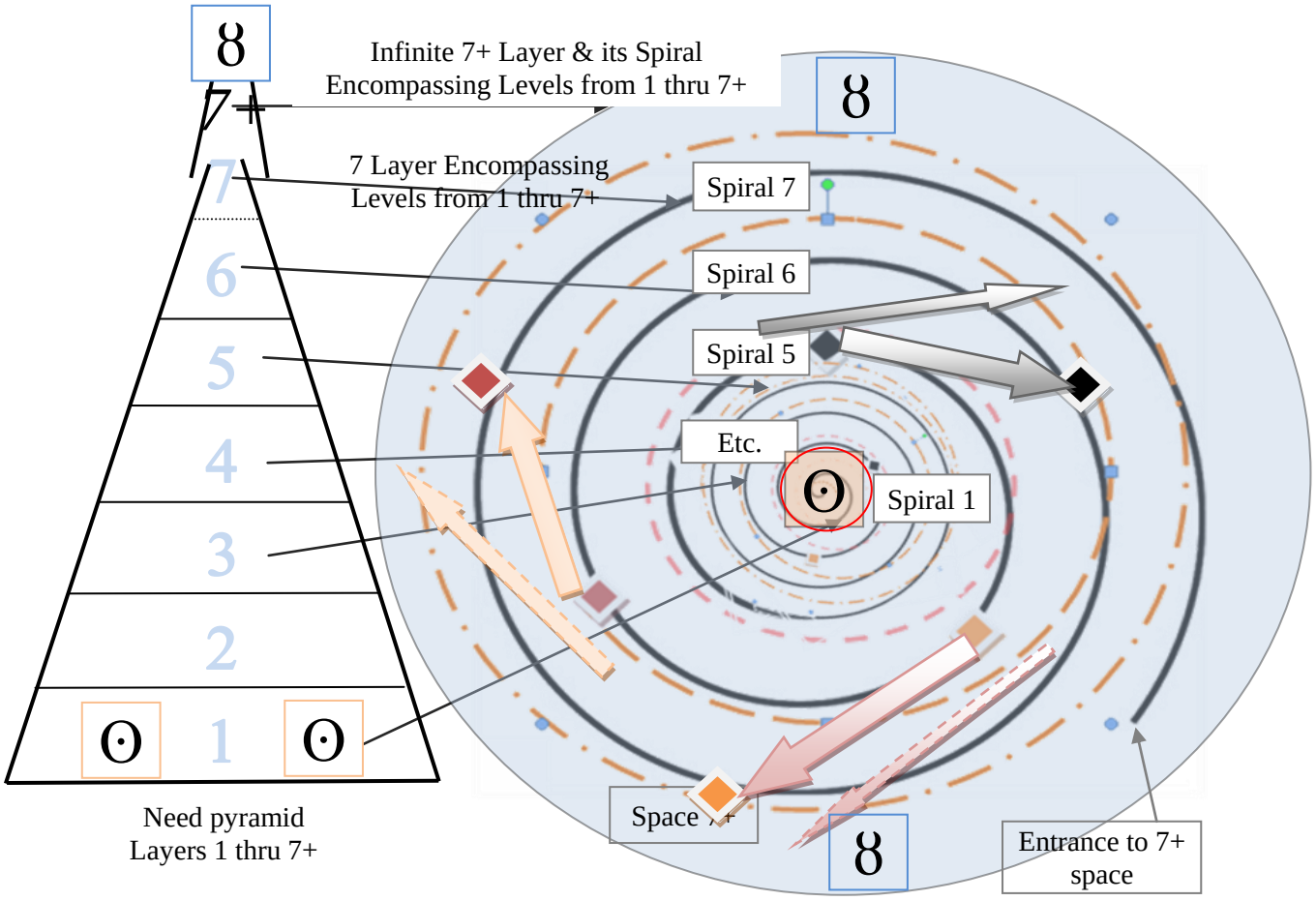


Fig. 7a The Expansionary Spirals to accommodate the movement of the state of Mindlessness (symbolized as zero with a central period Θ), to Mindfulness (symbolized as a top-open vertical infinity 8). The former state is indicative of the Freudian ID and the later state is indicative of the world class leaders such as Gandhi, Tagore, Lincoln, Aristotle, Socrates, etc.

Mindfulness[3] is an inverse of mindlessness; it is an exit into a virtual state of being consumed by infinite objects, verbs, and convolutions but with definite Order and a Scientific methodology and network of all body, mind and spiritual noun objects, verb functions (their activities) and their respective convolutions.

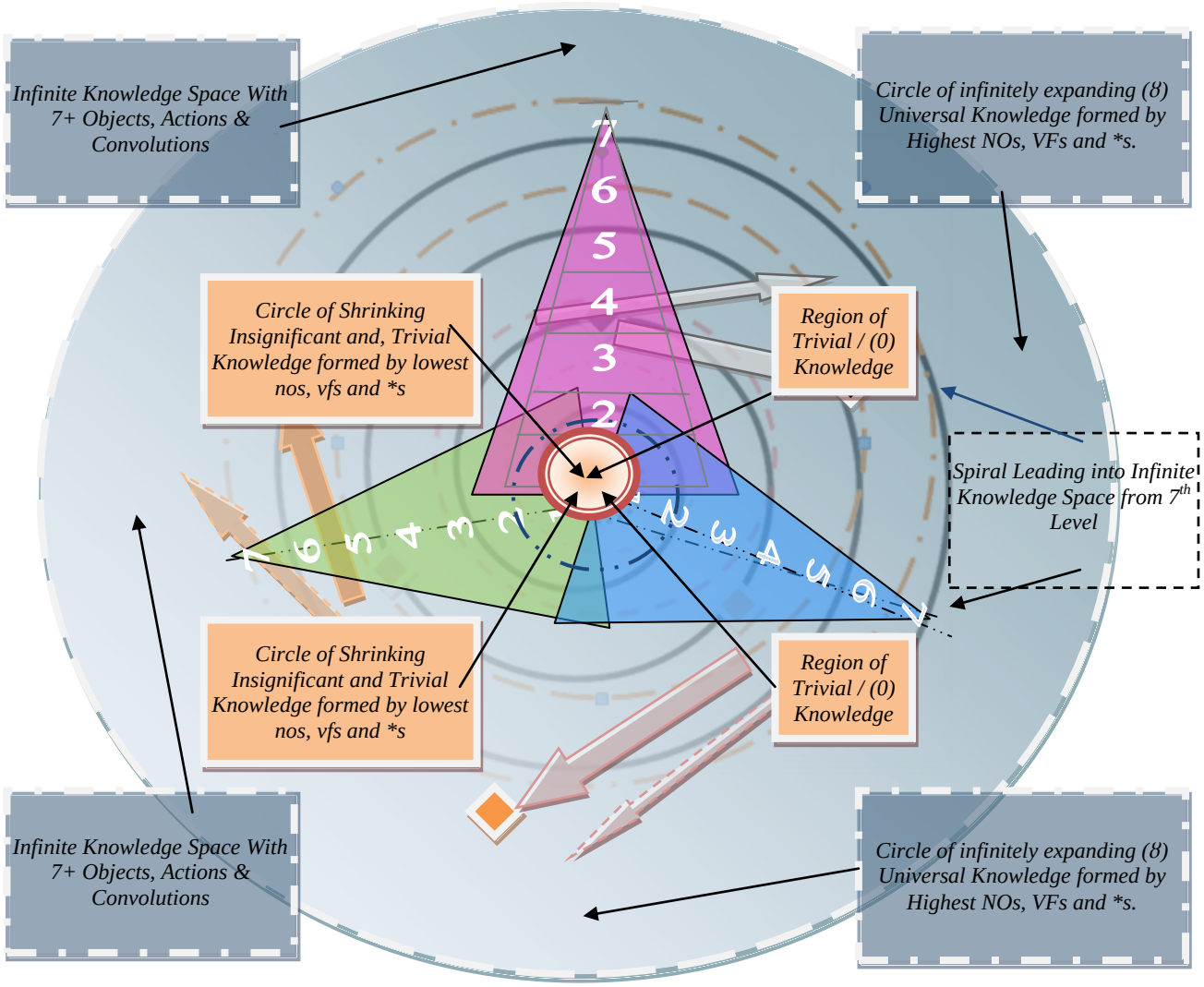
[3] Two symbols Θ and 8 are suggested to indicate the Mindless and Mindful. The former symbol signifies a zero person who is entirely self-centered with a period in the middle. The later suggests a daring individual who reaches into the infinite mind sets (∞) of others to help and enjoin others to state of physiological, mental and spiritual bliss, at least for the time the body, mind and soul are together in a lifetime ($\Delta t = \Sigma\, \delta t$ and $T_\infty = \Sigma\, \Delta t$). The vertical nature indicates the effort of such a person to reach out to others. The open top of the vertical ∞ indicates the passage to willfully extend beyond ∞ as we know it in mathematics and physics.

All aspects of sciences, medicine and scripture are woven together as TVB or (Aristotelian Truth (T), Virtue (V) and Beauty (B)), themselves interwoven as a set three expansionary spirals (see Figures 7 and 7a) spreading into three infinities in three (if not more) dimensions. Time get dissolves in three dimensions and assume the face(s) of T, V, and/or B.

The regions 7, 6, 5, 4, 3, and 2 indicate lifestyles saturated at gratifying the needs at levels 6, 5, 4, 3, 2, and 1 respectively. For instance, region 7 is inclusive of the selfless love of Indian Philosophies of Gandhi [19], Tagore [20], or of the Greek Philosophers Aristotle, Socrates [21] and the region 5 stops at the "love" of Self Realization at Level 5 of Maslow's Need hierarchy [1]. Region 7+ becomes inclusive of all lower-level needs but with the strongest sense of neural and intellectual control. The bounds of n's, v's and *'s are firmly established when the individual X enters the 7+ region. The levels of knowledge, concepts, wisdom, and ethics as depicted in the Knowledge Trail [18] are also tied into the knowledge bases holding of *n's, v's,* and **'s*.

D. Expansion of the Mind Set (8, a Top-Open Vertical Infinity)

The movement from one region to the next to the higher regions is an evolutionary process; whereas the degradation to the next lower levels becomes a degenerative process. Both processes can be time-intensive. The evolution being can be as quick as a Revelation (for the apostles) or slow as gradual learning in a university or a shrine (for Buddha).



Notes and Explanations: The Blue Space is the Infinite Knowledge Space that houses 7+ Objects, Actions & Convolutions. It is accessed at the end of the 7 th spiral and reached by the 7 th level noun objects that practice 7 th level verb function and 7 th level convolutions. This is one of the highest achievements of human beings over long periods of persistent effort or from a Revelation. In contrast, the brown space is by the 1st level noun objects that practice 1st level verb function and 1st level convolutions. This is one of the lowest levels that the living species in which is trapped by refusing to move into slightly higher levels of existence. The level of existence can vary from levels 3+ to the levels 7+ for most cultures and societies.

Fig. 8. The Outer Spirals have infinite expansionary space to move from the 7+ layers to 8+, 9+, … 8∞ layers. It is doubtful if a mortal frame of mind can acommadate these supreme layers since the lifespan of humans ends in demise. However, in introspection, one can envision the climb from layers 1 through 7 in a rational frame of mind.

VI. Spirals of Personality Saturating at 7 and 7+ Layer(s)

This layer is a reached by a few in their prolonged (and perhaps never-ending) search for multiple infinites of noun objects (*n's*), verb functions (*vf's*) and their convolutions (**'s*) aimed towards the (Aristotle's TVB, see Section IV) to serve humanity, preserve Nature, and propel pristine purity. Much like the velocity of light in ether space, these few run out of energy (E), inspiration or light (L), or/and lifetime (T, see Section I). Knowledge, Wisdom, Concepts, and the Ethics (as envisioned by them) live beyond their physiological lives, if they are documented and preserved in the libraries, shrines, and more recently in the secure and uncorrupted world-wide knowledge banks (wwkb's).

The state of this ideological garden of wisdom is shown in Figure 9 with divergent arrows. A few enlightened humans like Buddha, Christ, Moses, and Muhammad, return to preach the humans at lower levels to strive towards the ideals of the 6th and 7th levels

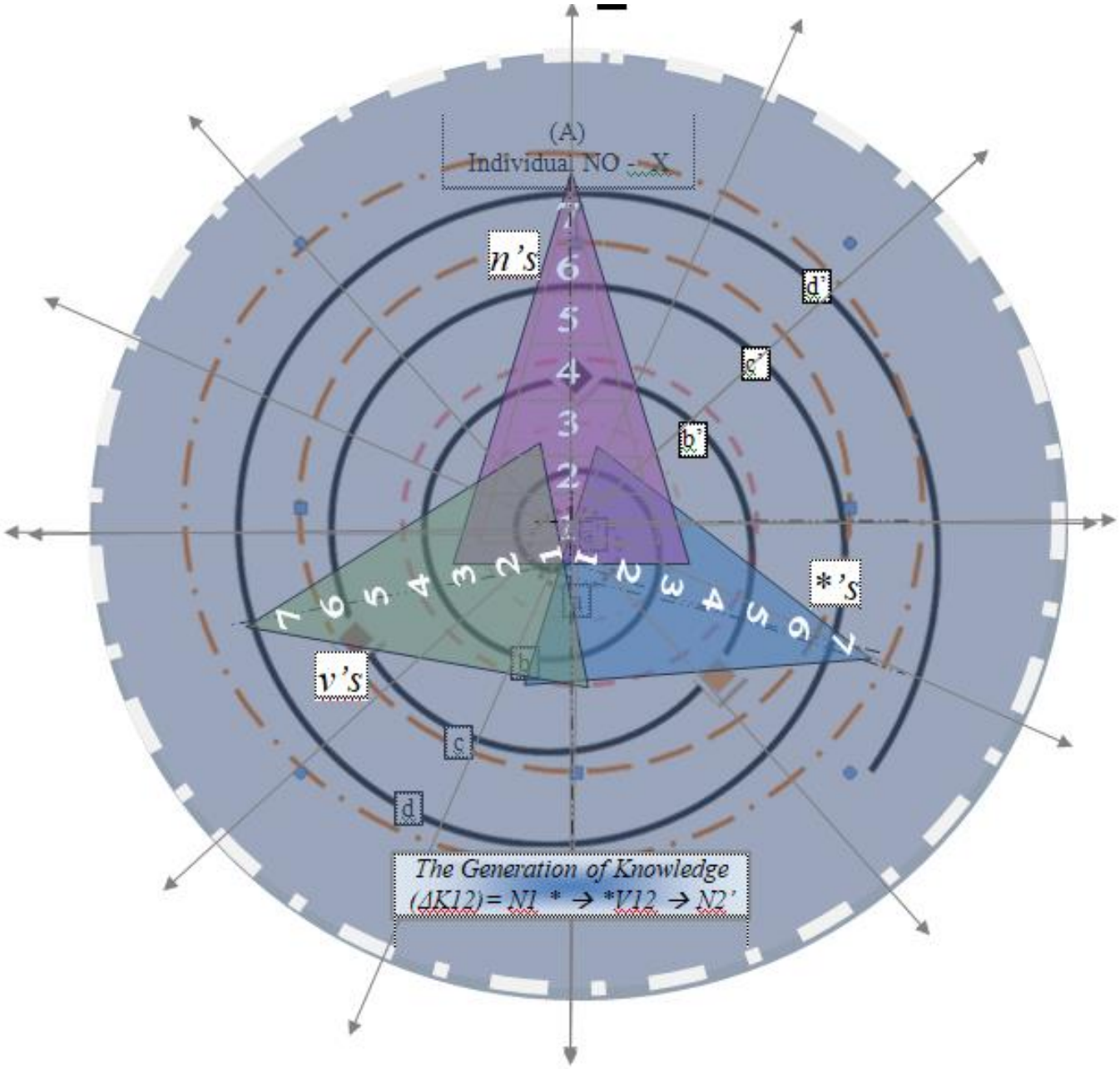


Fig. 9 Depiction of state of a species when, where and how (time, space and order) become universal as eternal, infinite and peaceful respectively. The helixes become infinitely large to consume the Object n, No, or X (Box A) into Energy ($E=mc^2$), the Verb Function causing gravitational force ($F= m_1 . m_2/d^2$) and convolutions into (Order and Intelligence in Nature, human intelligence and/or AI) respectively or combinations thereof. The generation of elements of knowledge ΔK12, ΔK21, ΔK121, etc., and their respective summations ∑'s (see Figure 5 caption) also becomes universal.

VII. Knowledge, Mind, and Society

Knowledge has a profound effect on the mind. Mind that mediates all activities and affects health and conscience balances lives to be productive within the framework of performing the activities to gratify the needs to be alive at the lowest level to be a hero or a superhuman at the highest level. With the recent changes in technology, the

knowledge in knowledge bases has experienced exponential growth to the extent a human mind is confined to remain productive in highly specialized fields.

Society as a collective integral of the finest lives and minds is boosted by the activities to refine and broaden the knowledge that society needs to be progressive. Knowledge is not sustainable unless the society nurtures its sources, funds its growth, and values its contributions towards its own growth. Thus, the mutual feedback needs to continue during infancy to become lively.

In Figure 10, the role of the active minds of the founding fathers of any society, culture, or nation is depicted. It emphasizes that these creative, ingenious, active, and selfless individuals who work as cohesive groups who seek to gratify their highest levels of Needs depicted in Figure 4a. During seclusion, even individuals have initiated the movement towards a better society. In this modern age of Intelligent Internets, such individual needs and resources depicted in Figure 4b.

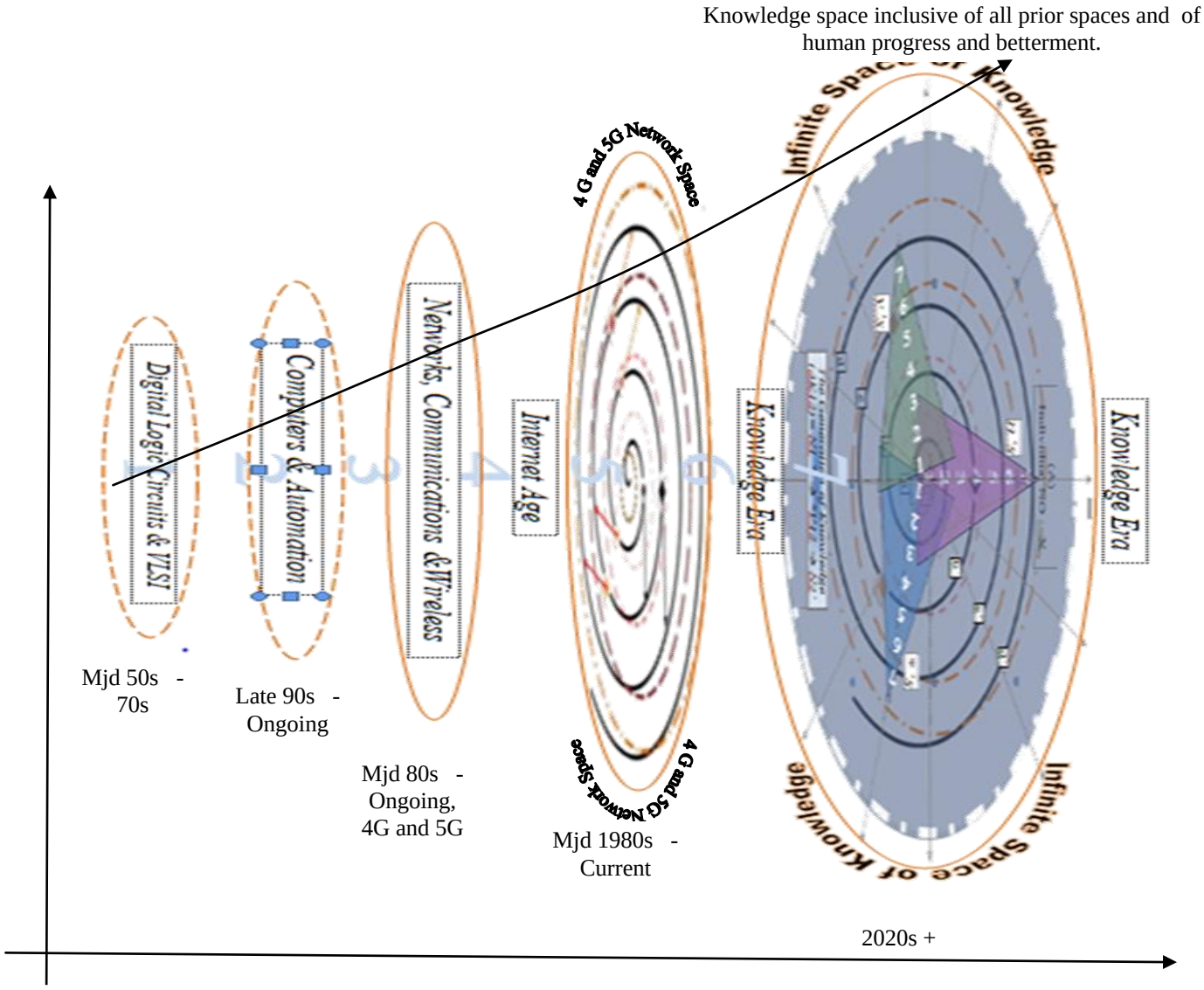


Fig. 10 Movement of the Society towards a Knowledge Era from the Internet Age.

VIII. CONCLUSIONS

Topics in this paper cross numerous disciplines. Only the most significant concepts are distilled here to build a scientific basis for the generation of new knowledge-based on the innermost needs of all the species including human beings. The intellectual evolution of the knowledge domain society has been enormously fast and genetically more intelligent. Knowledge domain society has been the chief beneficiary of advances in hard sciences, engineering, technology, and the art of scientific innovation. The growth of human intelligence is accelerated many times over by the growing needs in the modern society, the tools and techniques in Artificial Intelligence, and then by the again by the use technologies, themselves growing exponentially. Multiple exponentials have resulted in the last few decades.

To maintain an academic consistency of this paper, we have presented the highlights and the significant contributions these disciplines necessary to evolve the Science of Knowledge and Behavioral Science. It reinforces the notion that actions embedded in behavior evolve further knowledge; and conversely, the evolution of knowledge refines the individual actions and their convoluted intelligence.

These increments of knowledge are integrated in a systemic order and a symbolic language of notions and concepts. The growth of knowledge elements is then integrated into a larger block of knowledge. This procedure has been documented many times in computer and social sciences. These major steps are summarized to gather the conclusions leading to the evolution of habits, behavior, and actions towards the betterment of humankind, preservation of Nature, avoidance of major military conflicts, disorder, and disarray. On a smaller scale, the evolved behavior also provides a basis of satisfaction and peace within the local confines of the community and society.

The ultimate target of the knowledge space (Figure 10) is to incorporate social and behavioral sciences in the realm of the Internet and Next Generation networks. Historically, the stable civilizations had incorporated wisdom and social conduct towards peaceful existence. Their leader slipped and fell into long-range irrationality, injustice, greed and selfishness. Unfortunately, this trend is recurring and the cyclic drama. The difference is that the errors in the nuclear age and ICBMs can be destructive on a global basis. The telltale of this downfall of the human nature has occurred in Hiroshima, Palestine, Syria, Libya, and the Middle Eastern countries. Perhaps the hope lies in deploying the methodology of *human vision* (rather than computer vision as it exists in AI) and *conduct recognition* (rather the pattern recognition borrowed from AI) and finally practicing nurturing and nursing (rather than wounding and killing). An integrated, enforceable ethical knowledgebase (Figure 4b) to detect the early signs of crooks who get elected as leaders would help peace and justice would prevail longer and longest. Nature (Global Warming, Ozone Layer Depletion, COVID-19, etc.) does intervene when human conduct fall grossly out of balance.

REFERENCES

[1] A. Maslow, (1943). "A Theory of Human Motivation", Psychological Review, 50(4), 370-96. See also Maslow, A. H. (1954). *Motivation and Personality*. New York: Harper and Row and Maslow, A. H. (1968). *Toward a Psychology of Being*. New York: D. Van Nostrand Company.

[2] S. Freud, Basic *Writings of Freud, Modern Library*, New York, 1938.

[3] C. Jung, *Modern Man in Search of a Soul*, Routledge & Kenan Paul Ltd., London 1933 and 1961.

[4] E. Berne, Games People Play: *The basic handbook of transactional analysis*. Ballantine Books; Reissue edition, August 27, 1996.

[5] A. Maslow, *Farther Reaches of Human Nature*, Viking Press, New York, 1971. Maslow, A. H. (1970b), Religions, values, and peak experiences. New York: Penguin,(originally published in 1964. Abraham H. Maslow has written 20 books and significantly contributed to numerous fields in sociology, behavior, motivation, and social psychology.

[6] A. Maslow, (1970), *Religions, values, and peak experiences.* New York: Penguin,(originally published in 1964. Abraham H. Maslow has written 20 books and significantly contributed to numerous fields in sociology, behavior, motivation

[7] S. V. Ahamed, *Computational Framework for Knowledge: Integrated Behavior of Machines*. Wiley, 2009. See Chapter 13 for details. Also see S. V. Ahamed, The architecture of a wisdom machine, Int. J. of Smart Eng. Sys. Design, 5, (4): 537–549, 2003

[8] Eulers constant, https://en.wikipedia.org/wiki/E_(mathematical_constant), approximately e = 2.718281828459045

[9] Plank's Constant, https://physics.nist.gov/cgi-bin/cuu/Value?hev 4.135 667 696... x 10-15 eV Hz-

[10] S. V. Ahamed, "An enhanced need pyramid for the information age human being", in Proceedings of the Fifth Hawaii International Conference, Fifth International Conference on Business, Hawaii, May 26–29, 2005. Also see "An enhanced need pyramid of the information age human being, paper presented at the International Society of Political Psychology", (ISSP) 2005 Scientific Meeting, Toronto, July 3-6, 2005. For a detailed discussion of the Seven-Layer need pyramid, see Intelligent Internet Knowledge Networks, Wiley (2007), Chapter 9, pp 241-265.

[11] G. H. Mead, *Mind, Self and Society*, University of Chicago Press, Chicago, 1934.

[12] N. Chomsky, *Distorted Morality*, Production Koch, Studio Wea Corp., DVD released, Mar. 2003

[13] F. Crick, *The Astonishing Hypothesis – The Scientific Search for the Soul*, Simon & Schuster, Touchstone Book, New York, 1995.

[14] R. Cyert and J. G. March, *A Behavioral Theory of the Firm*, Prentice Hall, Englewood Cliffs, NJ, 1963

[15] H. A March and J. G. Simon, *Organizations*, John Wiley & Sons, Hoboken, NJ, 1958

[16] Poynting's theorem, https://en.wikipedia.org/wiki/Poynting%27s_theorem, dealing with the Vector P = E X H

[17] S. V. Ahamed and S. M. Ahamed, "Quantum Flow Theory of Knowledge", Journal of Multidisciplinary Engineering Science and Technology (JMEST) ISSN: 3159-0040 Vol. 2 Issue 5, May – 2015; on-line www.jmest.org, JMESTN42350710 954

[18] S. V. Ahamed, *Computational Framework for Knowledge: Integrated Behavior of Machines*, Wiley, 2009, See Chapter 15, Pages 444-482.

[19] M. K. Gandhi, Gandhi, Autobiography: *The Story of My Experiments with Truth*, Beacon Press; Boston, MA, 1995. Also see a very good book about M. L. King, C. Carson *The Autobiography of Martin Luther King, Jr.*, Warner Books, New York, 2001.

[20] R. Tagore, https://onemorelibrary.com/index.php/en/books/literature/book/indian-literature-373/gitanjali-3074, Nobel Prize for Literature 1913.

[21] Socrates, https://plato.stanford.edu/entries/socrates/ lifetime (469–399 B.C.E.)