

Thought, Energy, Time and Social Confines of Knowledge

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Abstract

In this paper, three virtual but dimensioned entities are used to contain knowledge; while it is by itself abstract. Knowledge resides in knowledge-banks of computers and the Internet. More importantly, knowledge resides in all living species. The main emphasis is on the human species that construct their personalized knowledge structures and banks that they deploy to resolve their personal Needs. Such needs drive behavior and adaptive. Both these human characteristics are alive and get influence by human interaction. These dimensions have human (thought), scientific and physical (energy and time) orientations. It becomes feasible to build a hyperspace for knowledge and confine it in the three dimensions of thought (anchored in the personality of an individual), energy, and time (both anchored in both physiological and physical spaces). We present the personality aspects based on the human needs that drive the human being (a noun object, n) to perform actions (one or more verb functions v) in intelligent steps (convolutions (?) between n 's and v 's) to gratify the needs. Needs are inherent in human personality to maintain life.

Index terms— knowledge, time, human interactions, human thoughts, noun objects, verb functions, convolutions, knowledge and time.

1 Introduction a) Knowledge Science as a Scientific Discipline

A framework of measuring, quantifying, and predicting knowledge in any particular direction defined by the Dewey Decimal Systems or the Library of Congress classification is presented in Reference [3]. Such knowledge-centric objects (KCOs, see footnote 1, Section 1.2) can indeed be constructed in the memory systems of computers. These KCOs have volatile and dynamic boundaries that couple with the human mind/ psyche or with other KCOs to image the reality of the physical space. The attributes and bondage of the KCOs are altered by the knowledge systems much as the numerical values and their dependencies are altered by the CPUs and programs of computers.

2 b) Fragmentation of Knowledge

Elements of knowledge (shortened as kels) to represent knowledge can be a computational entity that can be processed as numerical, logical, and/or informational entities in computers and networks [1,2]. The command languages and processing architectures for knowledge systems become progressively more intricate, elaborate, and structured [see Chapters 5, 6, and 7 in Reference 2]. Though, more complex knowledge processing systems can be construed and built dependably as the knowledge bases and knowledge management systems now distributed throughout the Internet and knowledge web sites. Even though such knowledge systems do not function as precisely, accurately and dependably as the more established computer systems, they perform more precisely, more accurately and more dependably than the human counterparts who also process knowledge to find one or more solutions to the real problems in life and society. K as the chemical elements bond with other elements and generate new compounds and molecules. In the domain of knowledge, the laws of convolution with other kels are flexible and adaptive, but maintain rationality for the mind to perceive knowledge in its microscopic or macroscopic formats in the real world and the mental space. Both the real world and mental space spans nations, cultures, and societies.

3 D) DYADIC INTERACTIONS AND TIME LAPSE DURING

44 Knowledge in human activity blends like chemistry within species in nature. In most instances, larger bodies
45 of knowledge are composed, enhanced, used, and utilized to benefit the existence of society. The fundamental
46 precept behind all the widespread generalities is that the lives of all species are based on dynamic actions of
47 objects that make life feasible by prolonged strings of actions continually in the time dimension. Objects and
48 actions trigger the mind into a life-form based on the answers to seven basic questions; why, who, what, how,
49 when, how long, and where. The mental coordinates are established. Information is processed and knowledge is
50 acquired. The long cycle from prior knowledge to the derived new knowledge continues ad infinitum

51 The strife between good and evil is the theme of vicissitudes in lives. The inner self that refuses to accept
52 anything but the best leads to the search for the best for each one (i.e., each noun object(s), no or no's) with
53 honor, justice and dignity accomplishing the each one of the deeds (i.e., each verb function(s), v or v's) in a
54 tactical and socially acceptable way (*). In a nutshell, the theme of activity becomes (no ? * ? v) or (no('s) *'s ?
55 v(s)) in a time sequence that a machine can execute with the probabilistic result(s). The central processor unit
56 (CPU) of such a machine follows a series of executable statements that can be written down as {? ((no ? * ?v
57)) from ' t' to 't+?t'} in real-time. The motivation (why) for the no (who), the (what) actions (v's) in real-time
58 duration from 't' to 't+?t' (when and how long), and a probable outcome after an interval are established.

59 The parameters listed above are entirely programmable as operators, operands, and operational codes, in
60 knowledge machines. The machine emulates the actions, behaviorism, and modality. The most probable outcome
61 is stacked away to be combined with other executable statements. The series of actions can thus be optimized for
62 the most desirable (expected) result from any social, corporate, national, or any strategic result. The expenditure
63 of energy to function causes its depletion and reduces the tendency to remain active indefinitely. A sense of
64 balance between the extra expenditure of resources and the expected gain in the marginal utility that is thus
65 derived curtails excessive effort in any given direction. The balance becomes global and a sense of fairness and
66 justice prompts most humans to be generous and positive based on gratification and peace. The Second Law of
67 Microeconomics becomes the basis for the human race to progress in a positive direction.

68 In the other direction, when resources are limited, the conflict between self-interest and fairness starts to
69 surface. The fears of the future sometimes dominate to obliterate the glory of being righteous in the past. Greed
70 and negativity sets in. The first and second need levels from the Need Pyramid [4] projected into the future,
71 cast a grim shadow over the fourth and fifth levels of need-gratifications from the past. Fear of fear makes the
72 insecure drown in greed, hate, and violence.

73 The knowledge machine is more than a communications tool. It has all the potential of being an intelligent
74 partner to interact and act as a highly logical human or a highly emotional companion. During training the
75 machine, the machine acquires the personality of the "other" interactive human. The machine personality is
76 augmented by internet knowledge bases that provide, validity, verification to provide answers for the saint (with
77 positive priming of the machine functions (such as the knowledge-operation codes (kopc's of a KPU [5]) and
78 connectivity to intellectual and verified KBs).

79 Conversely, a negatively primed machine can also provide for the mafia and thugs by connectivity to mafia
80 and their associated knowledge bases. Also, the machine acquires the most desirable interface for the interacting
81 human based on the "mood" of the user, just as a therapist would adjust the sessions based on the attitude of a
82 patient. Human temperament though highly variable is accommodated by appropriate macro commands at the
83 interface.

84 The two vividly different philosophies of human thought are founded on the elite processes for the social
85 betterment by the practice of truthful, virtuous, and beautiful deeds in society one side and on the despicable
86 processes for social contamination and its downfall. The emulation of the human behavior of the elite is feasible
87 by positively primed Knowledge Machines (KMs) [6] and conversely, the emulation of the deceitful, arrogant,
88 aggressive, and hate-ridden actions of the perverse groups of the population, for social erosion of established
89 ethics and morals. Knowledge machines being mindless can address both sides of human nature and personality.

90 3 d) Dyadic Interactions And Time Lapse During

91 Interaction Time is of the essence in all knowledgegenerating processes. An example of a two object N1 and N2 is
92 presented in Figure 1. N1 initiates a verb function V12 directed at N2 with a convolution *1 which is responded
93 by N2 directed back at N1 with a convolution *2. During this transaction, an element of knowledge ?K 12 is
94 generated. Conversely, after the response, another element of knowledge ? K 21 is generated. A series of these
95 exchanges generate two bodies of knowledge bok12 and bok21. A profile of relation between N1 towards N2 and
96 conversely between N2 towards N1 gets developed and retained in the perceptions of N1 and N2 respectively.

97 Certain social protocols and codes are embedded during the interactive process.

98 It can be seen that if the interaction id between two human beings N1 and N2, then the personal attributes
99 of both are invoked. Likely primed humans interact according to the code of ethics in their way and depend on
100 the intelligence of each.

4 II.

5 Bilateral Human Relations

Bilateral human relation between two individuals N1 and N2, depicted in Figure 1 is a symbolic model of the interaction process. Both N1 and N2 have Needs to be satisfied and assets to satisfy. However, social interdependencies force most individuals into a negotiating stance (dashed lines in 1) when the needs of N1 may be adequately satisfied by personal assets or better satisfied by the assets of N2 and vice versa. Even though this computational model is symbolic and number oriented, it reveals computational cycles and the instability that can arise in real life and in the computational processes, which follows the interactive process.

Largely, in just societies, the laws of fair trade tend to equate the net worth of assets exchanged thus maintaining a framework for stable and repeated social interactions. Many variations and exploitations are possible due to ignorance, greed, or cruelty. To deploy such situations the use of the five variable $l, m, n, j,$ and k becomes appropriate. However, two such sets of variables $l_1, m_1, n_1, j_1,$ and k_1 for N1 and $l_2, m_2, n_2, j_2,$ and k_2 for N2 become necessary. Besides, any nonlinearity between the attributes of N1 and N2 also need consideration. In the knowledge processor (KPU) or machine environments the each object influences the response in a symmetric fashion. Asymmetric relations occur when one objects has power or authority (such as social position, boss, ownership of resources, etc.) over the other.

Many thousands of types of human attributes, their nature, and the numerical range of the variables and their interrelations account for the innumerable types of human interaction. The KPU of a knowledge machine is thus capable of simulating the entire spectrum ranging from an insignificant exchange of trivialities to a cruel war between nations. Figure 1 depicts a bilateral interactive model for interaction for two individuals. The role of the two individuals is reversible and the centerline of symmetry runs horizontally through the computational model. Further elaboration of this diagram results in a more comprehensive computer model presented in Figure 2. 1 and 2 are presented in References [7,2]. Mathematical models of human interactions are presented by Roman, et al, [8,9] and Pen [10] present the symmetric interactive processes. The nature of the interactive process is based on an economic exchange of assets offered and concessions received by both parties. Four possible outcomes predictable by the models are (1) smooth convergence to a mutually satisfactory result for the interacting parties; (2) oscillatory convergence; (3) oscillatory-divergence without any agreement resulting from the interaction; and (4) smooth convergence without an agreement. In such interactive processes, instability and oscillations result in a waste of time.

Such a framework becomes applicable as (intelligent) objects undergo a process in the KPU environment of the KMs. The oscillations can take on numerous forms in the intelligent object behavior. On the one hand, the response can object over/under reaction, out of context responses to certain verb functions (VF), yet on the other hand, the response can be opposite of that expected for any predefined VF. Rational or irrational behavior is feasible thus invoking two (logical or illogical) reactions from the other party. Briefly, the rational-logical interactive mode leads to a convergent and sensible interaction, while irrational/illogical mode leads to the most severe (even destructive) oscillations and/or divergent interactions.

The control of such oscillations lies in the predictive capabilities of each/both parties to the final and desirable goals for both parties. In essence, the mechanics of the systematic processes of interaction between intelligent objects, in reality, is portrayed by the status of the objects and their attributes in the knowledge machines.

Intelligent objects and knowledge machine would be able to function at two levels. Level-1 functions monitor the progress towards the achievement of goals in a mutually beneficial fashion, whereas level-2 functions track the stability of the negotiating process and monitor the status of the objects and their attributes from becoming, divergent, explosive, and mutually exclusive. The KPU [5] thus functions at an "intellectual" level (level-1 functions) and an "emotional" level (level-2 functions).

In abused knowledge machine, psychotic and abnormal behavior of intelligent objects is forced by implanting oscillatory and abrupt changes in the values of $l, m, n, j,$ and k , for evaluating the response(s) of the object(s). Bilateral instability in the parameter ($l, m, n, j,$ and k) values is likely to be a cause for conflict, confrontation. A series of violent and turbulent changes can only lead to war and destruction.

6 III. Basic Truisms for Needs, Satisfaction, and Energy

Knowledge science methodology can be implemented by novel computer architectures. It was conceived and presented [6] as far back as 1993 and 1994. Knowledge science as a scientific discipline was presented in 2006 [11] and further expounded in 2009 [2] based on the theory of knowledge. The convergence of knowledge science, computational programming, and its machine implementation as they can be implemented in the Science of Medicine was presented in 2013 [12].

In this section, we present a matrix approach to the uneven flow of knowledge in social and cultural settings. Knowledge is always in a state of transition and flows from one or more social or a natural source(s) to one or more receptors, the delay and dispersion of knowledge are related to the media characteristics represented as a matrix. The source and receptor characteristics also play a part in the communication of one element of knowledge (symbolized as a kel). These kels being of any size and nature can be integrated in a coherent and cogent fashion to make microscopic or macroscopic bodies of knowledge in organized, structured, and sensible knowledge in the human minds and in addressable segments of knowledge bases in networks and on the Internet.

162 Small and large bodies of knowledge (symbolized as boks) can thus be organized, reorganized; processed and
163 reprocessed; retrieved and stored; adjusted and organized; and optimized and enhanced to suit the reality of
164 most social and scientific settings.

165 When perfect knowledge is being perceived, we present nine basic questions that are logically centered around
166 the active verbs (symbolized as vs), participating nouns (symbolized as nos), and their interrelations (symbolized
167 as * or convolutions) that constitute the pursued knowledge. In answering these questions entirely, a framework
168 of perfect knowledge will be gained, if the answers have a scientific basis or explanation. In real-life situations,
169 partial answers to a selected subset of these nine questions are generally sufficient to carry on a function or
170 a dialog in a pragmatic sense. Answers to one or two of the nine questions do not present significant, useful,
171 or pertinent knowledge and such answers generally degrade the quality of knowledge. The methodology and
172 frame-work are presented in detail to expand and to enhance the pursued knowledge to a targeted goal, even
173 though it may not be an optimum or a perfect goal.

174 Knowledge has been an integral part of all life forms since millennia. Modern machines offer new tools and
175 technologies to use and reuse knowledge in everexpanding ways. Their positive deployment has helped human
176 progress as much as its abuse has caused wars, destruction, and social stagnation. In hindsight, abuse has always
177 retarded the flow towards the betterment of society. Numerous social scientists have highlighted the cause and
178 effect relationship of the social forces on the human inertia to the toil make building elegant knowledge and social
179 environments.

180 A universal platform for the integration of social science is desirable to make knowledge a science and then
181 to use the computer, network, and Internet technologies to accelerate the positive social movement despite the
182 social resistance by reason and methodology, rather than by force and violence. The positive conserves human
183 energy and offers more lasting solutions.

184 In this vein, we suggest the use of machines that can serve as computer-aided knowledge systems that handle
185 the rationale and logistics beside the deployment of constructive knowledge. A mathematical framework is also
186 proposed that can formulate the basis of discovering knowledge behind the obvious information to make the
187 proposed solutions enduring and sustainable. Longer-lasting stable solutions to most knowledge-based problems
188 make the investment in knowledge science attractive.

189 The delay in social media cannot be undone, and all communication systems suffer from the setback. Delay in
190 social and human communications systems can be very long slowly depriving the utility of the original knowledge.
191 In some cases when the original knowledge is based on extreme truisms, immortal beauty, and/or universal virtue,
192 the knowledge itself assumes a flavor of immortality. For example, Boolean algebra, Tesla's conception of rotating
193 electromagnetic fields in polyphase motors, Rumi's verses, Buddha's teachings carry their validity, appeal, and
194 integrity after many centuries. The converse statement is equally true; e.g., Bush's lies about the weapons of mass
195 destruction (WMD) in Iraq followed by Tony Blair's acts of a war based on falsehood; Vietcong's brutalities and
196 Ku Klux Klan's assertion of white supremacy have all brought unwarranted disarray into the world. The matrix
197 of communication is frail, time-dependent, and it can materially change the contents of any body of knowledge
198 (BOK or bok). Knowledge machines deserve to be made secure against the abuse by manipulative folks!

199 The emotional and value of knowledge content becomes dependent on the Social (S) Media matrix that can
200 drastically alter received signals. Then this matrix is tuned with average transmitter (e.g., a newscaster), average
201 unbiased media channel (e.g., a university broadcast system), and an average unbiased receptor (e.g., a typical
202 college student), then the chances are that the received signal is a faithful replica of the transmitted signal. But
203 this situation is hypothetical and in reality, every received element of knowledge gets tainted to some extent
204 other. However, in the vast majority of cases, the receivers generally get enough coherent knowledge to exchange
205 ideas in human dialogs.

206 7 a) Complete Knowledge

207 Knowledge at any stage is imperfect; imperfect and incomplete may be, it still conveys necessary information to
208 abide by the laws to survive, live, and even progress by controlled measure(s) over finite durations of time. In a
209 limited sense, order and organization appear to dominate what is known in answers to a set of logical questions
210 about anything, any time anywhere and in any social and cultural context. The saving grace lies in refraining
211 from asking the question(s) that intellect cannot resolve and the mind cannot perceive. Human and mental
212 resources are constrained, if resources are not the limit, life-span is.

213 In a very rational way, one can seek the answers to Why? What? How? Who? Where? When? Duration
214 (or how long?) for any element of knowledge, only to be frustrated that innate and unrestrained curiosity has
215 no logical or rational end. A combination of these questions posed together will only cause more frustration for
216 the mind and disarray in the thoughts. When appropriately constrained, the answers to these questions lead to
217 well structured and duly ordered solutions to many scientific and social problems. Given any body of knowledge
218 about anything, an intelligent human or machine can query in at least seven different ways (each by itself or in
219 combination(s)) repeatedly to reach the frail edge of what is known.

220 In the knowledge domain, where every microscopic element of knowledge rests in a noun object, a verb function
221 to and from other noun objects, inappropriate convolutions, has no immunity from these questions. However,
222 this quest leads to a few guideposts. The answers to at least some of the questions form a stable neural net in the
223 brain to encompass a noun-object, a verb-function, or a convolution in their rights that can form linkage to such

224 other cluster(s) and the neural net can grow larger and larger and become more and more stable. If the answers
225 are derives based on science, truisms, social benefits, and economic principles, then the borders of rationality
226 are pushed deeper and deeper in the neural nets in the brain; the personality becomes stable and larger tasks
227 (verb-functions) can be accomplished more effectively and more efficiently with larger and larger noun-objects in
228 a refined and orderly fashion.

229 In a gross and macroscopic form, the fundamental question (Why?) and its answer lead to life itself: since
230 every living member of every species has to sustain its life form, all energies stem from this essential requirement.
231 Physical, psychological, social, intellectual, etc., venues have been carved out for the orderly flow of these energies
232 over the eons of existence. More recently, computers and networks have altered the flow and storage of knowledge
233 that permits the channeling of these energies in optimal and efficient ways to achieve sets of goals and ambitions.
234 The role of the new advances in technologies become crucial in finding innovations, sciences, and technologies to
235 help mankind a more elated and more civil way to live and exist with nature without destroying it.

236 In most environments, searching for the answers to the seven basic questions leads to objects and things;
237 their actions and accomplishments; and how these objects do what they have to do or what they have done.
238 Knowledge starts here! Embedded in related objects, actions, and how they blend. Stated more precisely, every
239 module or element of knowledge (kel) is founded in one or more noun-objects, one or more verb-functions, and
240 their respective convolutions.

241 **8 Table I:**

242 Seven Logical Questions and Their Implications in the Machine and Network Environments When knowledge
243 elements are broken down into their building blocks, machines become invaluable in reaching targeted goals of
244 speed, efficiency, and accuracy. Computers, networks, and digital systems in the knowledge era have the innate
245 ability to handle knowledge at its lowest to its highest levels in three distinctive ways as follows:

246 i. Machines can and do grip and load the noun objects (no's) from their very rudimentary form as cellular and
247 microscopic objects to large bodies of knowledge as (BOKs such as books, knowledge bases (KBs), tables, series,
248 texts, etc., as operands by bringing them (or their address(es)) to the Operand Registers (ORs). ii. Machines have
249 the innate ability to construct and construe verb functions (vs) from nano-, micro-, midsized to macro, to cosmic
250 processes, etc., as operation code by hardware, micro-programmable, or macro programmable codes by bringing
251 them (or their address(es)) to the Instruction Registers (IRs). iii. Machines have the innate ability to lookup
252 a context-dependent table that selects the appropriate convolution (or a set of convolutions) to combine one or
253 more elements of knowledge or kel(s) and assemble a series of context-dependent microinstructions. Machines
254 move the result of it's (address(es)) to the output register(s) or (ORs).

255 All the software tools and methodologies currently used in computer engineering become applicable in the
256 knowledge domain as knowledge-ware tools and methodologies in building and designing major knowledge-ware
257 systems. We present the

258 **9 b) Human, Social and Computational Environments**

259 In human environments, the search for answers to the seven basic questions (Why?, What?, How?, Who?, Where?,
260 When?, and Duration (or how long?)) leads to pursuit of (social) knowledge. In the computational environments,
261 the search and the continued nature of these answers in the real-time leads to noun-objects, verb-functions, and
262 their convolutions that have significance to the processes and communications of knowledge elements. Typical
263 answers to these questions in the human and social domain as they relate to the computational domain are
264 presented in Table II.

265 **10 c) EBB And Flow of Knowledge**

266 The velocity of the flow of knowledge is as variable and dynamic as life itself. Static knowledge is no knowledge;
267 instead, it is indicative of a coma-static mind and body of any object or entity. More ever, the velocity is neither
268 uniform in time or space. Hence, the velocity of flow of objects, the rate of flow of activities, and the rate of
269 change of their convolutions all play a role in the flow. Objects and their activities are equally important in all
270 aspects of social and machine tasks. The pattern of the ebb and flow of verb functions, noun objects, and their
271 convolutions can have a commonality in their flow and they are rarely synchronized.

272 **11 Overall Theme: Begin Start?? Restart?? Execute?? Moni- 273 tor End?? Continue/Finish?? Prolong**

274 IV. Knowledge-Based on Actions (N*V)

275 Knowledge is derived from the gratification of needs of objects (n's). Such needs fulfilled by one or more
276 actions (v's). Incremental knowledge gained by the process (n*v) is arranged and accumulated in the neural nets
277 of the object(s).

278 It is then-onwards intelligently (*) used, reused, modified, enhanced, customized, etc., by objects (including
279 machines and knowledge processors) by being more productive and optimal. Further knowledge exhibits
280 exponential growth; and bears a signature(s) of the factors deployed in the deriving the ensuing knowledge.

281 This axiomatic truth is eternal for every object from microbiological to planetary cosmic entities. It is yet to be
 282 confirmed if this axiom is true for virtual objects after verifying if objects can be virtual! Any object without
 283 any need to sustain itself does not need any knowledge. Conversely, since all objects have some definable form or
 284 structure, some extent of knowledge is inherent or embedded within its structure. As an extension, the higher the
 285 needs and or their structure more knowledge and its structure are embedded or learned to sustain the structure.
 286 In an extreme case, virtual objects have linkages to others that define and reinforce their structure. Infinitely
 287 virtual objects may not have structure, but that becomes a philosophical issue. For all species, certain actions
 288 are necessary to gratify one or more outstanding or deficit needs at any instant of time. These actions depend
 289 on thought, energy, time (TET), and social constraints for the entity (n or no, n's or no's) enacting the verb
 290 function(s) (V, or vf, v's or vf's). The role of the intellect becomes evident in the choice and convolution *'s
 291 of v's (i.e. *v) concerning its optimal gratification of the deficit need(s). Thus, process n ? v becomes very
 292 personalized.

293 12 b) General Structure Of Dyadic Interactions

294 Interactions constitute relations of species and social entity without any interaction (whatever) is a lifeless social
 295 unknown black hole. In a traditional environment of everyday life in the current Internet Age, a scientific basis
 296 becomes essential to be precise and computational, the interaction needs a framework and a blueprint even though
 297 the format may be violated on many occasions, there a basic theme that can be formally programmed for social
 298 machines. The computational space follows this pattern in time dimension thus following space-time coordinates
 299 in the memories, processors, and peripherals of the social machines. This space can be traversed, reversed, and
 300 optimized for efficient replicas of social interactions, even though social interactions in the real and neural spaces
 301 are irreversible in the time dimension. Numerous representations may exist and depend on the type and nature
 302 of the interaction.

303 The type of convolution is also contextual and differentiated as *12 or *21 Typical of these interactions are
 304 presented as follows: $(n ? v \text{ and } (v ? n); n \hat{a}?? v \text{ and } v \hat{a}?? n)$ $(n ? * ? v)$ or $(n('s) *'s ? v(s)) \{? ((n ? * ?v))$
 305 from 't' to 't+?t'

306 $n1 * ? *v12 ? n2$ from $n1$ to $n2$ as action/reaction, and an element of knowledge ($\hat{I}?"K12$) is generated after a
 307 finite element of time $?t$ $n2 * ?*v21 ? n1$ from $n2$ to $n1$ as reaction/action, and an element of knowledge ($\hat{I}?"K21$)
 308 is generated after a finite element of time $?t$.

309 In formalizing the steps of a typical dyadic social interaction, we present the following steps presented as a
 310 noun object $n1$ (or $no1$) initiates a verb function $v12$ and the mode of interaction is established as follows. This
 311 basic elementary process is represented as $(n1 * v)$. Further, broken down this process is written down as: $(no1$
 312 $*12 v 12 ?no2)$; or as $(no1 * v 12? no2)$

313 This element of any elementary transactional process is shown in Figure 3b as follows: A forward process
 314 (full lines) with a through e steps is followed by a backward process (dashed lines) with f through j steps. This
 315 elemental transaction is repeated many times to depict an entire interaction between any two noun objects $n1$
 316 and $n2$.

317 A computation diagram of the interactive elemental process is depicted in Figure 3c. The dyadic nature of
 318 the process is embedded in the symmetry of the diagram. Nature and the interaction can vary indefinitely in
 319 real-time making human behavior unpredictable but the machine can guide the verb functions (v's) goal-oriented
 320 and intelligent (*) when the personal profile of both participants is known or estimated. The case is similar to
 321 that of an embedded intelligent agent (IA) making the appropriate changes toward achieving the desired goal.
 322 Such adjustments are proposed by Drucker [13] in the Practice of Management of corporations.

323 13 c) Dyadic Interaction-based Knowledge Generation

324 Processes based on $V*N$, $(N1 * V12 ? N2)$, $(N2 * V21 ? N1)$, Actions are undertaken to gratify any need
 325 of an individual ($n 1$) to affect the need that supplied the motivation to act ($V12$). It may also involve a
 326 reaction from another individual ($n 2$). A dialog is thus started. Positive actions gratify, null actions spend
 327 energy but do not gratify, and negative actions further enhance or intensify the need. Hence the effect of social
 328 action/reaction also starts to have special features. When the secondary object, $N 2$ is a machine, network, or
 329 a computer, the natural intelligence of $N 1$ and the Artificial intelligence embedded/programmed in $N 2$ are
 330 invoked. Convolutions (*'s) form the intelligent linkages between Nouns (N's) and the Verbs (V's or action).
 331 Thus the symbols $N*V$ becomes an element within ($\hat{I}?"k$). In general, convolutions (*'s) i., e., the intelligence
 332 of the individual deployed in combining the i th need with the j th action of the individual play a dominant
 333 role in the outcome. However, these actions are circumstantial and dynamic. They are alive and individual
 334 adding attributes the personality. Integrated over a population in a culture or society, these distributions become
 335 significant in defining their response.

336 Derived knowledge now starts to assume a statistical distribution with a mean and variance. When different
 337 needs have different intensities of need, then positive, null, or negative intelligentsia deployed over a period from
 338 't' to 't+?t' seconds will have negative, zero, or positive effects on the need intensities.

14 d) Timing and Sequencing and Structuring of Knowledge

An accurate mathematical simulation of human interactions is not as practical as much as corporate management is not entirely an accounting program. However, when management and accounting are intertwined the Practice of Management is a practical methodology to control corporations. Whereas accounting, production, and inventory controls are numerical, the human aspect in management still defies numerical analysis. Behavior and control may not be entirely numerical but it supports human relations to be goal-oriented and optimal and remains in the confines of allocated limits of time and be within the accepted norms of the society. These concepts are presented to enhance and guide the human aspects. The role of understanding and knowledge is vital and necessary to prevent humans from becoming robots and to prevent robots from becoming humans. In the intermediate stages, the machines can be built to be humanistic [14] as much as humans can be mechanistic [15] during the Industrial Revolution.

The current semiconductor chipmakers and technologies are unable to manufacture the VLSI chips to embed the necessary IA tools and make the timing V.

15 Role of Knowledge in Human Interactions and Vice Versa a) Media, Social Setting And Knowledge During Interactions

The interpretation, deduction, and construction of elements of knowledge $\hat{I}''K$ and $\hat{I}''\hat{I}''K$ are depicted in Figure 4 when two noun objects $n1$ and $n2$ interact to gratify their needs and to the benefit of themselves and the benefit of each other. The depiction has two additional parameters $?12$ and $?21$ to incorporate the media characteristics 2. The Media box has its own transmission characteristic for the flow of the increments of knowledge $\hat{I}''K12$ $\hat{I}''K21$. So the knowledge sent for each of the increments is not the same as what was received. This occurs because of the differences in the personalities of $n1$ and $n2$, the media characteristics, and the instants of transmission and reception. Miscommunications can thus be programmed in this model. Each of the participating objects evaluates the numerous elements ($\hat{I}''K12$ and $\hat{I}''K21$) received and as $K12$ and $K21$. These knowledge profiles help navigate next dyadic session to improve the efficacy of communication or alter the quality of relationship.

. The media effects can be reduced to some extent by the receptor but with an additional effort, time, and energy. In a majority of cases, the distortions are uncorrected and the verb functions (v 's) are misconceived.

2 These characteristics include the effects that the Media can attenuate and distort human actions and their characteristics. This situation is a vivid reality in audio and video interactions. In reality, the media change the context, the intent and purpose of human interactions. Political and personal gains are accomplished in the current knowledge era and the Internet age. about $n2$ $\hat{I}''K12 = n1^* ? v12^* ? N2$ $K21 = ?\hat{I}''K21$ $\hat{I}''K12 = n1^* ? v12^* ? n2$ $K12 = ?\hat{I}''K12$ Noun Object $n1$ Noun Object $n2$ $\hat{I}''Sent$ $n2^* ? v21 ? n1$ $\hat{I}''Received = ?12$. $\hat{I}''Sent$ $n1^* ? v12^* ? n2$ $v21$'s $?21 ?12$ $\hat{I}''Sent$ $n1^* ? v12^* ? n2$ $\hat{I}''Received = ?21$. $\hat{I}''Sent$ $n2^* ? v21^*$? $n1$ $v12$'s

The misconceptions in many cases lead to misalignment of the thought processes of both $n1$ and $n2$ and are a major cause for confusion and conflicts. A reason for disharmony and disarray is implanted. In most cases, the damaged relations occur because of the selfish interest of $n1$ and/or $n2$ by willful or coincidental events to cause a rift. Actions are not always retrievable and cause permanent changes in the boundaries of humans, societies, generations, and even nations. Welcome partnerships and global wars are possible depending on the leadership role of $n1$ and/or $n2$. It becomes particularly important that the cooperative or conflicting noun objects $n1$ and $n2$ be perceptive of the verb functions or $v21$'s and $v12$'s consistent with the flow of dyadic interactions. Such goal-oriented clues can be programmed by computer systems even though the effectiveness can not accurately be predicted. On a statistical basis, such computerized clues of humanist machines may be trustworthy. In dyadic human interactions, errors are rectified and the boundaries of human relations are reestablished based on prior history.

16 b) Role of Economics in Human Interactions

Economics plays an implicit role in the negotiations presented in Figures 1 and 2. Largely the benefit derived by $n1$ is approximately equal to the cost of assets expended in "buying" such benefits from $n2$ and vice versa. Social interactions have a very fuzzy outcome and results. Perceptions of either and/or both $n1$ and $n2$ play a crucial role. There are six possible scenarios and listed as follows:a) SUCCESSFUL INTERACTION $\hat{I}''W 1$ » $P 1$ (viewed by $n1$) $\hat{I}''W 2$ » $P 2$ (viewed by $n2$)

where $\hat{I}''W 1$ is the worth of the benefit received by $n1$ and $P 5a$ and b depict the representation of interact, negotiate and/or innovate (even love/hate) events between $n1$ and $n2$. Such an event can be as routine as a casual conversation or as crucial as a United Nations ceasefire treaty. The effects of social conditions, timing, duration, personality predispositions and media distortions, reporter biases, of the participant are duly considered and included in the two figures. Figure 5b is more inclusive and takes into account the economic balance between the 'give and take' for $n1$ and $n2$.

In Figure 5a, the Center Line of activity (all verb forms V , v , $*V$, $*v$, $?v$'s, etc.) is at the horizontal of the center of the figure, with $n1$ and $n2$ occupying the top and bottom half of the figure respectively. All activities pass through the Central Interactive space. The entry into this space passes through two other horizontal lines to represent the media distortions, biases, and the effect of the political maneuvering and manicuring of $n1$ and $n2$ each. The arrows pointing upwards into the upper half arrive from $n2$ and pass through the transmit characteristic

399 of n2 at the lower line and through the receptor characteristics of n1. The converse scenario exists for downward
400 arrows from n1 to n2. This methodology is borrowed into human communications from Transmission Line Theory
401 and is well documented [16]. The mode of operation is full-duplex [17]. Typically the 'Give-Take' situation the
402 resource for the event should be treated as 'Give' refers to 'thought, energy and time ot (TET)' and the take refers
403 to the "utility" or the worth derived from the event. An underlying economic transaction occurs and it can lead
404 to the six outcome presented in Section 5.2. In all-machine (robotic) environments, the human aspect(s) should
405 be replaced as the embedded/programmed intelligence in the machines (robots). In human -machine interactions,
406 the machine reacts only to extent it has been primed or by the response of intelligent agents programmed in the
407 machine.

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409 Reflection, reverberations, and time delays occur in all instances. All aspects of electrical and optical
410 communication theory are applicable in human communication and the knowledge gained or lost also influenced.
411 The human communications such effects are particularly important, especially during political events.

412 17 VI.

413 18 Conclusions

414 A methodology and formalism are presented to deal with knowledge from a scientific perspective. The basis
415 resides in tracing the changes in real and perceptual spaces by tracking the causes for their changes initiated by
416 Nature, all life forms, and by machines.

417 The methodology is symbolic and systematic, though not an entirely numerical. On a localized basis, the
418 driving forces and the extent of change in the structure of knowledge may be estimated and linked through the
419 timing and sequence of events that lead to the completion of any event.

420 It is emphasized by the fact that every action in an event requires a finite element of time, however small or
421 large it may be. Time is of the essence for any event to occur and to change the ensuing structure of knowledge
422 associated with the event.

423 The lineage is established in time-domain; and it is continuous. The equations for the occurrence of verbs within
424 events are by a "cause-effect relationship" rather than a purely numerical equation. The knowledge equations
425 are a new breed of symbolic equations and are not related precisely as the equations as they exist in physical
426 sciences. The principles and concepts are emphasized to traverse the knowledge space initially and this paper
427 should be read as an entry point in the science of knowledge rather than a conclusion of the discipline. The
428 science of knowledge is like the science of management as it is applicable in most corporations. The variability in
429 knowledge science is more widespread since every human, society, culture, and nation is a unique entity. Laws of
430 conduct and behavior become variable but a realm of "order and ethics" exists in all most all transactions and
431 the verb functions within the transactions.

432 All entities exist because of the underlying needs that drive these entities to exist and survive as objects for
433 their respective lifespan. Eventually, all objects will deteriorate and disintegrate including knowledge objects.
434 The mutual dependence on other entities infuses a rule of fairness and economics to maintain the balance between
435 "give" and "take", even though such balance has been grossly violated in balance with Nature, between humans,
436 societies, cultures, and nations. In a sense, the basis for "good" and "evil" originates in this balance. It may
437 be unseen, but sensed in the many "spaces" within the self, mind, and society. The corners of the profile of the
438 personality of every entity gently float around in these spaces (see Appendix A) every time changes occur.

439 Highly dynamic and extremely fast knowledge transactions defy their simulations on computer systems in
440 real-time since the CPU and KPU clocks are based on fast Cesium (Cs, atomic number 55) crystal clocks. These
441 clocks are deployed for computer and network functions but it is doubtful if the lattice vibrations in these rare
442 crystals can maintain the flash of genius or the retinal response of a human or an eagle eye. The AI programs
443 and utilities that surround humanistic machines will definitively retard their simulation thus reasserting the
444 supremacy of mind over matter and a even greater supremacy of mind over machines! ¹

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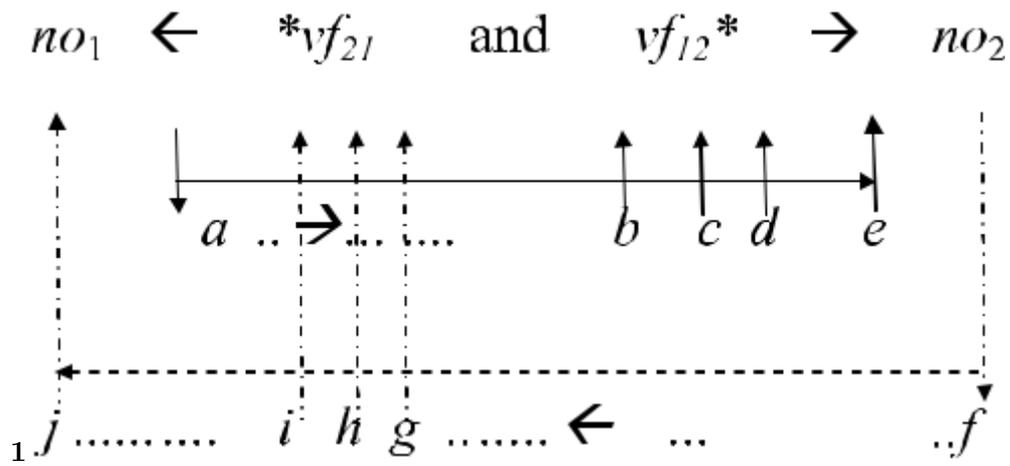


Figure 1: Figure 1 :

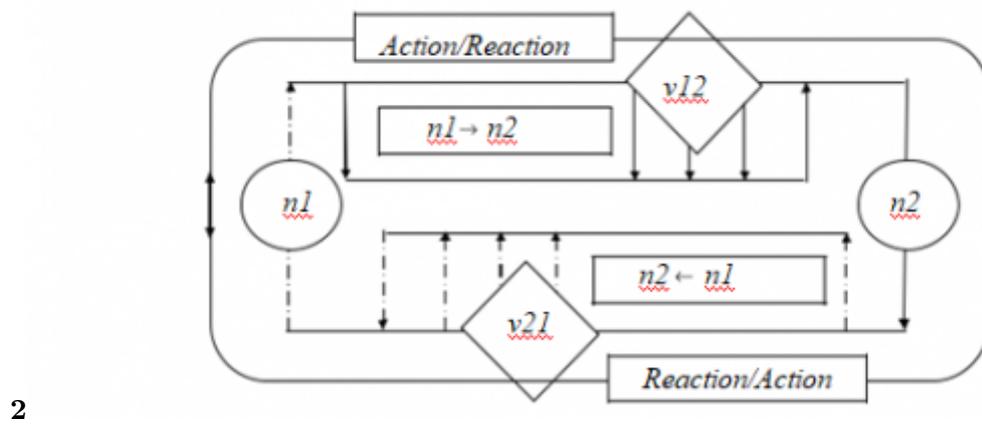
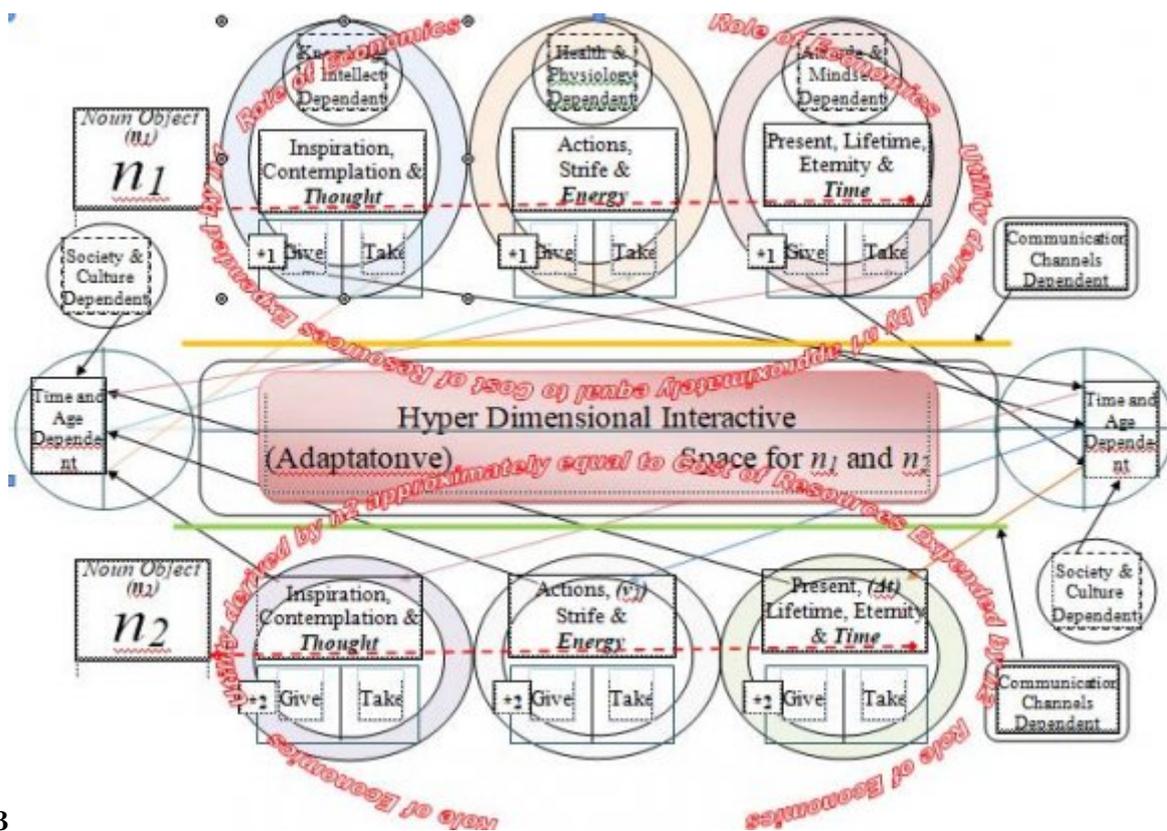


Figure 2: Figure 2 :

(Adaptive or Innovative)

Figure 3:



3b23

Figure 4: Figure 3b : 2 ?Figure 3 a

3 (Adaptive or Innovative)

Figure 5: Figure 3 c

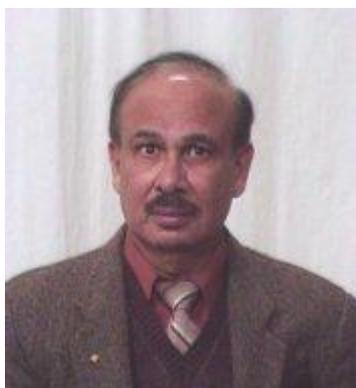


Figure 6:

II

Question/Partial	Answers Human and Social Entities	Objects (entities), Actions (perform) and Appropriate, Orderly and Organized (functions)
1. Why? Support of	1. To support & gratify the	1. Basic Needs: Freud (3-Layer), Maslow (5-Layer), Ahamed
2. Life Functions.	2. Needs to live and excel	2. (7-Layer), (Carl Jung, Marx and Mead, Smith, Keynes)
3. What? forms of Systems	3. All communication and	3. Preloaded or Down Loaded Programs in Devices that
4. of	4. computing interfaces	4. follow scientific, social, search, and their algorithms.
5. How?	5. Clicks and/or Operation	5. Learn and Use the preloaded programs in social and
6. Creativity.	6. of the devices and	6. communication devices.
7. Who?	7. Generally, Partnering	7. Human(s) and organization(s) partnering with other
8. Know. Systems	8. Individual or organization	8. social entities are involved
9. Where? (x, y, z)	9. The current location is	9. Distance is generally not an issue because of the
10. 't' (Spatial), etc.	10. generally implied	10. network/Internet connectivity
11. When? Past,	11. Present (Now)	11. This is the situation and problem-dependent parameter
12. Present, or Future "t"	12. (Again and again)	12. Execution times for the devices and transit times in the
13. Duration? 't'	13. As Fast as Possible (Again and again)	network or Internet and to complete transactions.

Figure 7: Table II :

f) UNSUCCESSFUL INTERACTION

$\hat{I}^?W 1 \ll P 1$ (Estimated by n1)

$\hat{I}^?W 2 \ll P 2$

(Estimated by n2)

c) A Comprehensive Representation of the Role of Knowledge
Two Figures

[Note: b) AGREEMENT, PERCEIVED FAIRNESS IN INTERACTION $\hat{I}^?W 1 ? P 1$ (viewed by n1) $\hat{I}^?W 2 ? P 2$ (viewed by n2) c) AGREEMENT, GENUINE FAIRNESS IN INTERACTION $\hat{I}^?W 1 ? P 1 ? \hat{I}^?W 2 ? P 2$ d) EXPLOITATION BY n1 IN INTERACTION $\hat{I}^?W 1 \gg P 1$ (in actuality) $\hat{I}^?W 2 ? P 2$ (in actuality) n2 comprehends (from its perception that $\hat{I}^?W 1 ? P 1$ or it has no mechanism to alter the prices. This situation occurs when there is coercion by n1. e) EXPLOITATION BY n2 IN INTERACTION $\hat{I}^?W 1 ? P 1$ (in actuality) $\hat{I}^?W 2 \gg P 2$ (in actuality) n1 comprehends (from its perception that $\hat{I}^?W 2 ? P 2$ or it has no mechanism to alter the prices. This situation occurs when there is coercion by n2.)]

Figure 8:

445 .1 Appendix A

446 Symbolic Representation of Knowledge Functions A1 ARROWS ? Forward knowledge process, i.e., the effect of
 447 the prior element on the following element. Backward knowledge process, i.e., the effect of the following element
 448 on the prior element. ? Generates a result or results. Can also modify the following verb v or a noun n in all
 449 spaces ? -Or modifies the status in knowledge space but on the prior n or v, in knowledge spaces -Generates a
 450 result, or results in a verb v or a noun n, and both directions A.2 NOUNS and Noun Objects Nouns are objects
 451 that initiate verbs and verb functions. They affect other nouns and noun objects (including themselves). These
 452 objects are affected by such verb function. The status is altered and during the verb is active the verbs which
 453 take a finite amount of time. n, n's, no, no's, N1, N2, NO, NO's,

454 .2 A.3 CONVOLUTIONS

455 A convolution process of interaction with n or v usually occurs between n and v or v and n that can be
 456 unidirectional (i.e., -, or ') or bidirectional (i.e., ' -) in its general form. This function of this symbol is
 457 contextual, syntactic, and semantic; and it can depend on n and/or v. The time forwardness is depicted by the
 458 direction of the arrow for the effect of the convolution as * or *'s A. 4 k, K, Ck, ?K, and as kels or KEL or KEL's,
 459 bok, BoK, BOK are also bodies of knowledge that can serve as nouns depending on the context of other n's and
 460 v's.kels. One or more elements of knowledge (in the knowledge space) associated kels or with (n v), one or more
 461 kels, are generated during or after the process

462 .3 KELs "â??" (n*v). (Italicization of n's and v's does not have any 463 significance).

464 A.6 PROCESSES

465 .4 PS

466 Psychological space with emotional ties to physical or mental objects, convolutions, and verbs KS Knowledge
 467 space(s): Subset(s) of mental space in the human mind, or superset/subset of the memory allocated for knowledge
 468 functions in knowledge machines. The main memory is thus tiered into three layers, operational or systems space,
 469 a knowledge space, and a real/simulation/application space for computing in the real physical/computational
 470 space. Human beings routinely deploy different KSs to store knowledge accumulated in different disciplines, or
 471 about totally unrelated noun objects. During solutions to knowledge-based problems, these spaces (RS and PS,
 472 RS, and SS) get interdependent and work coherently to solve knowledge-based problems or create new knowledge
 473 that can be mapped into the real-world as inventions or modifications of existing systems. Mapping back and
 474 forth from RS from and to KS are both feasible in knowledge machines as much as mapping to and back from
 475 SS to RS.

476 .5 A.8 INCREMENTAL CHANGES IN THE STATUS OF N AND V

477 ? An incremental change associated with the process (n* v) in the real space RS ? 0, but finite however small or
 478 large it may be and equals (n' B n; ' B ; or v' B v); ? can be sub-microscopic or super-cosmic, where B is any
 479 verb function upon or influence.

480 A corresponding change associated with the process (n v) in the knowledge space KS ? 0, but finite however
 481 small or large it may be and corresponds to real space change (n' B n; ' B ; or v' B v); ? can be tiny and
 482 incomprehensible or engulf the entire neural space (NS).

483 .6 A.9 TIME

484 Time in all spaces. Reversal of 't' is not possible in real space and MS but is feasible in KS, SS. Also used as a
 485 symbol in analog and continuous functions ?t or t, T by undo or undelete commands on the machines. Further,
 486 the time to complete any process in the real and/or knowledge spaces is t, ? t, and T. A span of time and ?t or ?t.
 487 Localized numerical operation is possible in all spaces but global reversal are impossible in any space. . The thirty
 488 chapter book, "The Evolution of Knowledge Science," published by Morgan Kaufmann (ISBN: 9780128093559)
 489 presents a comprehensive treatment of theory and flow of knowledge in the society based on a computational and
 490 a scientific basis. In this paper, the author generalizes the ideas further and offers a methodology for the mind
 491 to explore the (semi-)infinite space of knowledge and wisdom.

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