Article

The CHI Model of Functional Consciousness

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Abstract

A model delineating the specific functional aspects of consciousness is presented in terms of humankind's operational behavior. The interpretation's premise is that functionally conscious humans are always in a mode directed toward accomplishing a self-serving goal. These functional aspects of human consciousness are described in terms of three brain/mind/body activities: (1) Creative thought (***C****reaton*), (2) Human body action (***H****umanoid*) and (3) Implementation, goal driven operations (***I****mpler*). The ***H****umanoid* level is the most basic form of functional consciousness. The ***I****mpler* level combines the mind with ***H****umanoid* operations to coordinate and accomplish the goal-oriented task. The ***C****reaton* mode operates only when the mind encounters unknown regions of knowledge or understanding; searching for solutions to unsolved problems. Examples of CHI human behavior are illustrated revealing the broad scope of the functional parts of consciousness. The CHI model's potential for providing definition and guidance to the field of artificial intelligence is discussed.

Keywords: Creativity, human behavior, artificial intelligence, functional consciousness.

Introduction

The overall science of consciousness is not an easily definable topic. The most used, single-word definition for human consciousness is awareness [Oxford Dictionary -1996]. Consciousness has taken on many diverse viewpoints. Excellent reviews scoping the present-day studies and understandings of human consciousness are available. Here, philosophical, psychological, neurological, sociological, physical, quantum mechanical, and other available mind/brain sentient hypotheses, theories and models are summarized [Van Gulick-2018] [Nunez–2016]. Most of these present theories are based on brain-function interpretations where neurochemical and electrical brain signals are considered to play the central role in all types of brain guidance and body response. These are all physiologically focused descriptions of consciousness.

Since the brain is such a complex organism, the physiological aspects of consciousness are difficult to experimentally evaluate. It's no wonder that while claiming to focus on reality, none of these existing psychological models seem to have really done so. Since the time of Descartes and Locke (17^{th} to 18^{th} century), western philosophers have tried to come up with a universal

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definition of consciousness. However, because of its socialistically broad spectrum and enigmatic nature, it has been very difficult to pin down a universally accepted definition. Is consciousness a fundamentally coherent topic of understanding? Can it be explained mechanistically? What is the science behind one's "feelings"? How does consciousness relate to language? Can there be different classifications of consciousness? Can computer driven robots ever be designed so they possess any semblance of consciousness? - - certainly this later topic is critical to those working in the artificial intelligence field. To this day, none of these important questions have been satisfactorily answered [Nunez – 2016].

However, some progress has been made with the arrival of the Lycan consciousness model where consciousness is divided into at least eight different types: organism, control, state/event, reportability, introspective, subjective, and self-consciousness to name a few [Lycan-1996]. Following the Lycan model, Block proposed another model whereby consciousness was divided into only two groups; (1) phenomenal (P-consciousness) and (2) access (A-consciousness). Accordingly, P-consciousness is based on raw experience involving our bodily operational senses. Alternatively, A-consciousness is concerned with experiences that do not have an immediate impact on functional behavior. A-consciousness factors pertain to accessing information from our memories, decision making, remembering, verbal report, and the like [Block-1998].

While the Block model has achieved some acceptance, both the Lycan and Block models categorize consciousness in terms of mind-focused activities. Another mind focused model has been proposed by Jung who interprets consciousness in terms of four operations: thinking, feeling, sensing, and intuiting. This Jung model has been organized into a useable consciousness assessment research tool that is employed by psychiatrists and psychology professionals for patient evaluation. This scheme is known by the acronym MARI for Mandala (Symbol) Assessment Research Instrument. While MARI claims to be a body-mind oriented model, it should more appropriately be called a brain/mind focused model; other than the brain, no other parts of the body are involved in this Jung model [Jung-2018][MARI®-2018].

A very different, theoretical model of consciousness has been proposed by Penrose and Hamerhoff where quantum physics is introduced into the picture. Their view proposes that meaningful brain action is brought about by quantum level sub-atomic particles getting involved in brain-oriented quantum entanglement, wave-function collapse, and the like. Ultimately, they conclude that consciousness is all driven by quantum action. Their claim is that brain matter composed of "micro-tubes", contains quantum particles that are released or retained and thereby transpose themselves into brain operations such as awareness, cognition, and perhaps memory [Hameroff-1996][Hameroff-2014][Penrose-1989][Penrose-1994][Zalta-2015].

While this quantum physics consciousness model is interesting, it so far lacks any possible test methodology for experimental verification. This quantum physics model of consciousness can easily be classified in the realm of an impossible-to-prove hypothesis. Alternatively, neuroscientists continue to interpret consciousness as brain neurons circulating the brain in the realm of electro-kinetic brain signaling and consider quantum effects as unlikely. Due to the aforementioned lack of a testable hypothesis, this quantum argument for consciousness would be much more difficult to prove than to disprove. Resolution of this paradox is still pending.

To put the topic of human consciousness into perspective with the above views and the theme of this paper, the authors have assembled a diagrammatic view of what they refer to as behavioral consciousness; this is presented in Figure 1. Here, consciousness has been grouped into four phases of human behavior; emotional, recall, societal, and functional. In this Figure, behavioral consciousness is described as an integrally-continuous networking of body-brain, mind-thinking implementation operations. Figure 1 specifically denotes function as the only consciousness mode that is connected to a quantifiable human "product" or overt accomplishment. Unlike the other facets listed, the only human "feeling" achieved in the functional aspect is the feeling of accomplishment. Human consciousness in the realm of the functional mode is the total focus of this document.

With Figure 1 as background, this present paper will concentrate on detailing the functional aspects of consciousness. The proposed approach has been called the "CHI" model of functional consciousness because it interprets functional consciousness in terms of three continuous/over-lapping categories of real-world human behavior: **C**reativity, **H**uman -body physical action and **I**mplementation. Each of these three categories, or "modes", involve semi-distinct, definable, results. Here, emotion/attitude, memory recall and social brain/mind activities are always intangibly observable behaviors of the mind/brain/body complex. Furthermore, as depicted in Figure 1, all facets of consciousness are involved in a human's functional action. All this serves as the inner-workings of functional accomplishment. In this paper, the CHI model focuses only on the tangible/physical results of this mental action. The rudiments of this reality-based consciousness model are based on the intimate natural and communicative relationships of

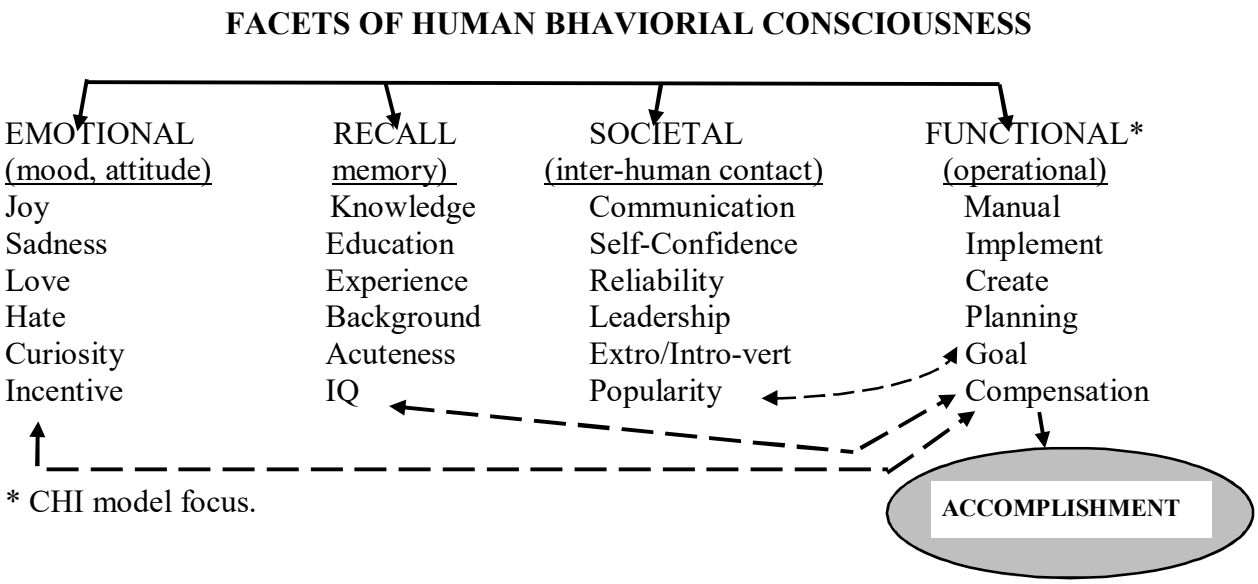


Figure 1: Intra-connected Aspects of Human Behavioral Consciousness with Focus on Function.

body interaction focusing on human behavioral accomplishment. More specifically, these three distinct mind/body human behavioral functions involve coordinating: (a) physical-mechanical operation of the human body, (b) mind-source guidance of the body to implement and accomplish a set goal and (c) the possible need for stretching the mind to create never before thoughts, approaches, ideas, and concepts needed to accomplish a goal. It is believed that these

three elements can serve as an index for compartmentally evaluating the functional aspects of human consciousness. Putting this into perspective with the consciousness models reviewed above, the Block "P-consciousness" interpretation of consciousness [Block-(1995)] perhaps comes closest to this proposed CHI model. However, it is felt that the CHI approach is far more specific and detailed to human experience and mind/memory/body functional than the Block "P-consciousness" model.

This document proposes that the behavioral functionality of humankind can be divided into three levels of conscious involvement: (a) Creative idea thought generation/processing (***Creaton*** mode). (b) Human physical manipulation/processes (***Humanoid*** mode) and (c) Implementation of processes (***Impler*** mode). This description can be referred to as the CHI (***C****reaton*/***H****umanoid*/***I****mpler*) model of human functional consciousness. The authors arrived at this interpretation during their years as a scientific researcher and behavioral consultant in both industry and academia, with a background in Applied Behavior Analysis. Paired with extended research in the study of both human and animal behavior, their study of the overt behavior of humankind helped formulate this model. Overall, the model evolved from their collective observations of human behavior as colleagues, team mates, fellow workers and teachers. It is their attempt to present a "real world" view of the functional aspects of consciousness in the context of all aspects of human consciousness. This CHI model shares its foundational base with the behavioral science of humankind.

Fortunately, Functional Consciousness (FC) appears to be an aspect of human consciousness that can be quantitatively described or witnessed. To accomplish this, FC is formulated with the hypothetical premise that whenever humans are actively conscious, their mind/brain/body system is operating toward accomplishing a self-serving goal or achievement. The purpose of achieving this self-serving goal will vary depending upon the particular person's motivating operations and what he/she is functionally striving to achieve. Human accomplishment is in itself a very broad subject depending upon complexity and time for accomplishments; there are immediate, short term, intermediate and long-term categories of accomplishment. All such events fall within the scope of the proposed CHI model. Also imposed on this is the purpose and motivation for the accomplishment. Overall, FC always involves mind-oriented pre-thinking. This must occur before starting any FC achievement. A perspective of these overall mind/thinking operations is diagrammed in Figure 1 which illustrates how FC ties into the other facets of consciousness. Once this mind-generated thinking/planning/chronology is complete, the person will consciously and visually start functioning/operating toward achieving and completing their pre-set intentional goal.

Meanwhile, the purpose for his/her planned action can and does remain generally hidden from view. These thoughts, feelings, "day dreams" and other mental actions that cannot be observed are known as "Private Events" (Skinner, B.F., 1945). That said, while one could not observe the "purpose" for another's action, it can often be inferred. For example, for someone who's suffering from hypothermia, you could observe a person attempting to find a warm shelter and "infer" their reasoning to be that it's because they are looking toward returning their body back to its normal temperature. Added to this scenario is what degree of enthusiasm and motivation does a person have toward accomplishing a set goal. Is the FC task pleasant? Not so pleasant? Is the task routine? Is the task a natural body function? Is it critically needed to survive? Gains

personal pleasure, etc.? The person's emotional state during achieving the goal can remain hidden from public scrutiny or can be witnessed somewhat by the demeanor the person exhibits while carrying out their focused task. Additionally, the ease at which a person approaches and executes his/her functional task will depend on the person's scope of knowledge, skills, individual needs, overall state of health, motivation to accomplish, prior experience, history, and availability of social reinforcement. All of these issues are ancillary and background to the person's functional accomplishment.

Whether its day-dreaming, running a marathon, driving a golf cart, kicking a soccer ball, watching TV, eating a hot dog or working on a quantum field theory calculation, the awake and aware human mind-brain-body triad is always working toward accomplishing a personally useful or satisfying goal. While the overall mental action required to do this is hidden in the mind of the person, the results of the person's effort are usually overtly observable, physical accomplishments. These visible and tangible "accomplishments" in the field of behavioral sciences are known as "permanent products" (Cooper, Heron, Heward, 2007). This document presents a scheme for operationally detailing the inner workings of a person's FC dedicated to achieving a goal-focused personal reward.

Humanoid Mode: The *Humanoid* level of CHI functional consciousness can be considered the most basic level of conscious mind/body involvement. To a sentient and perfectly healthy human being, motion of the body parts during sitting, walking, running, eating, swallowing, blinking, coughing, sneezing, and sleeping are natural human processes. While the brain/mind of awareness is always operating during these *Humanoid* processes, the mind is also always operating in this case, at a "low effort level". Here, the mind-body coupling is operating in a natural, hereditary mode. In some simple cases, this level could be regarded as the body-mind functioning in more of a 'robotic' mode. In this 'robotic' mode, the mind is naturally "wired" to direct the body to perform these natural acts. This is because the human mind is programed at birth and through growth/maturity to carry out these natural bodily functions, such as sneezing, swallowing, coughing, reflex movements, etc.

Now, within the realm of our current definition, one might consider the act of sleeping as being in a low level of consciousness. Sleep serves as a needed body/brain restorative function of all living beings. However, for the present FC discussion, let it be restricted to humankind in only the "awake state". To put things into perspective, the transition from sleep to awake-ness is mentally distinct. However, it can be a physically 'fuzzy' experience. By means of definition, one could possibly characterize the situation of a person just awakening from sleep, as being in their lowest, most basic level of *Humanoid* activity. Once awake, humans have innate abilities to execute natural and routine physical actions. Mind and body are biologically pre-programed to perform natural functions or performing "bodily services" – stretching arms and legs, rubbing the eyes, walking to the bathroom, urinating, proceeding to prepare and drink a cup of coffee just to name a few. These topics of human study are known as "phylogenic behaviors". The physio-mechanical act of walking is a simple example of a phylogenic *Humanoid* activity.

When walking, the human mind is naturally programmed to direct body function into the act of walking. Body-leg-foot motion are programmed to coordinate bodily action, balance, and direction of motion by the naturally programmed brain. This is especially true in the age of

humanity's viral youth. It is obvious that "walking" as an act of movement may require more effort and energy for some like those with artificial limbs, arthritis, or other physical/orthopedic medical conditions.

However, the brain-body-foot relationship is still programmed in the same way as one who does not suffer from these conditions. It is worth noting here that walking could in some instances be considered in the realm of a learned or "ontogenic behavior". Learning to walk stems from your learning to walk as an infant. Does an infant observe and therefore learn the walk from watching and studying the *Humanoidal* behavior of their parents or siblings? To some degree, this could be an infant's learned behavior. But humans are bipeds, they are naturally constructed to walk on their two feet as are all mammal bipeds. Once the act of walking is mastered, it becomes part of a human's phylogenic repertoire. Walking is a free will event that takes many forms; escape/avoidance (leaving a cold room and walking into a warm room, leaving a concert when it's too loud), or the act of walking could be reinforced automatically (if your legs are restless, it "feels good" to walk around). While there are many different reasons as to why a person would engage in the act of walking, the point being made is that no matter what the motivation for engaging in the walking act is, the same process occurs between the mind and body. Walking becomes a naturally programmed human function.

Impler Mode: Another level of functional consciousness is the *Impler* mode. Here, the brain/mind-body triad of functional humanity is involved in executing more complex tasks towards a focused goal. It serves as the path of someone following a pre-determined plan and working towards its implementation. For example, assembling a jig-saw picture puzzle would be someone following an easily decided upon plan and working at its implementation in order to reach the goal of a completed picture-puzzle scene. Note that in executing this jig-saw puzzle task, the *Humanoid* mode also operates by involving eye visual-shape-color and pattern recognition, as well as finger dexterity in placing the puzzle pieces into their proper positions. Another example of *Impler* action would be the act of someone preparing a written planning document or preparing a set of operating instructions for carrying out a set task. Here, the mind's decision-making process is employed. *Impler* action is projecting into the future, employing one's own past experience and knowledge, as well as imagining how the task should be carried out, are all part of the operation. In preparing this planning/instructional document, the *Humanoid* function of operating a word processor, paper shuffling, pencil marking type acts are also employed among other physical manipulation activities.

In the *Impler* mode, the mind, opinion, overall previous experience, academic training, knowledge, and instinct are all collectively involved in executing this *Impler* process. As the task to be completed becomes more complex, a person's *Impler* functionality would need to be much more sophisticated. It all depends on the task at hand and the inherent ability of the accomplishing person to carry it out to completion. Therefore, functioning in this *Impler* mode is of very broad scope whose breadth depends heavily on the background training and talent of the functionally conscious person performing the duty at hand. It is obvious too that some *Humanoid* manipulations are always needed to successfully implement a planned activity and completing it to its final actual physical "product" goal.

Creaton Mode: The *Creaton* mode is the specialized and optional level of FC. *Creatonic* human consciousness delves into a thinking mode area that has no precedence or guiding direction. Mentally putting some loose pieces together and coming up with an answer, interpreting data trends, or proposing a new hypothesis, scientific idea, concept or theory; these are all *Creaton* activities. A scientist responding to and/or explaining answers in response to a scientific "thought experiment" exercise is a good example of someone functioning in a deliberately induced *Creaton* mode. Scientists are, as they should be, quite comfortable in this mode. Interpreting research data/results for the first time is a good example of thinking in the *Creaton* mode. In this case, no one has ever seen these experimental data before. A conclusion will be reached. This is why the experiment was carried out in the first place and a conclusion must be reached even if the data are finally determined to be inconclusive. If inconclusive results are obtained, which in itself is a result, scientists will modify their direction/approach using these inconclusive results to arrive at a better-defined experimental work plan for the next round of experiments. In the situation where the scientist is reviewing data and concepts of other scientists, he/she must review these data objectively and sometime creatively arrive at results and conclusions that may be different from those proposed by the scientist whose data is being reviewed. Nevertheless, all of this involves operating in the *Creaton* FC mode.

Oftentimes, humankind activity and behavioral operations do not need to involve FC's *Creaton* mode. This *Creaton* mode is only applicable to special occasions and free-will induced circumstances. Most of humankind can survive very well without ever going too heavily into this *Creaton* mode. Therefore, the *Creaton* mode of CHI can be considered as being "optional". However, there are many people who thrive in this *Creaton* mode. Everyone has heard the old adage "necessity is the mother of invention". Any person who finds a necessity and successfully fulfills this necessity is an innovator functioning in this *Creaton* mode. Furthermore, if the inventor is to participate in reducing his/her inventive idea to practice, which is most often the case, the Humanoid and Impler modes would also be operating.

CHI Diagrams: In summarizing this section, the diagram below (Figure 2) collectively expresses the three basic levels of functional consciousness in terms of a geometric shape. This Figure can be considered to be an icon for this CHI model. The hierarchy among the three functions is indicated with *Humanoid* behavior (rectangle) forming the base that is intimately tied in with the *Impler* mode (trapezoid). As shown, the *Impler* level is a directly integrated step above the *Humanoid* level. *Impler* functionality is in degree and complexity coordinated with

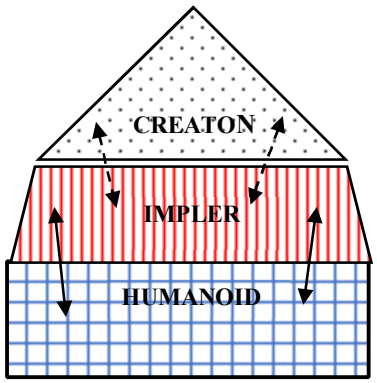


Figure 2: Iconic Diagram of Functional Consciousness

the *Humanoidal* function of the brain/mind-body activity. Skill development and experience characterize this level as one moves up in the diagram. Note, while the *Humanoid* level is always connected to the *Impler* level of functioning, it is also needed to operate in the *Creaton* mode. This is why the *Humanoid* mode can be referred to as the "base-operational" level of the CHI model. The deliberate connection between the *Impler* and *Humanoid* mode shows that some degree of *Humanoid* action is always needed in any act of human function. Some mind-control and coordinated brain processing-body action is always involved. Finally, the *Creaton* level (triangle) always requires the most non-traditional mental and conscious action. In Figure 2, it is optionally disconnected from the *Humanoid/Impler* FC duo. Here, the mind of the *Creaton* venturing individual is always delving into never before thoughts and mental experiences; its new thinking territory. The *Creaton* mode also has a transient nature to it and is invoked only when directed by the free-will of the involved agent. *Creatonic* thinking is always needed when humankind is involved in developing an inventive or novel idea or concept. However, it is always available, when needed or requested by the needing human. The fact that humanity ably functions in this *Creaton* mode provides the driving force for technological and intellectual progress. *Creaton* thinking by humankind is what keeps the social and technological advancement of humankind moving forward. Finally, at any given conscious moment, every living, actively functioning and accomplishing human can be characterized by having their own moment-in-time characteristic CHI icon shape. Also, the momentary "shape" of an individual's icon profile will/does change with education, experience, age, and of course the task at hand; it is never static.

Discussion

As introduced, the functional aspects of human consciousness as thus far described have several distinguishing characteristics:

- The premise of the CHI model is that when human beings are awake, aware or otherwise behaviorally conscious, they are always focused on achieving a self-serving goal or objective.

- Humankind's consciousness-state function is a fluxing 'blend' of three distinct operational modes referred to as *Creaton*, *Humanoid* and *Impler* (CHI) events.

- The most common humankind conscious operation involves an integral combination of the *Humanoid* and *Impler* modes.

- When performing a task, humankind generally operates by continuously inter-functioning between these three modes as needed to accomplish a task.

- Each of these three CHI modes have their own seemingly observable or measurable distinguishing consequences. They are basically a spectrum. The *Humanoid* mode will always hold to its phylogenic principles while the *Impler* and *Creaton* modes will be different for each person based on the agent's learning history, intelligence, educational

knowledge, experience, maturity, IQ, cognitive ability, etc. Also, these modes characteristically have more or less different mental or physical complexity depending upon the functional task being executed.

Let us propose that the most basic of *Humanoid* conscious functions occur when a person first awakens from a full night's sleep. Let us also narrow down for simplicity, the setting of a person awaking from a dream-less sleep. Awakening from a dreamful sleep can be complicated with some remnant fears or joy that will momentarily carry over to the awake state. Is the "shock" awakening from a nightmarish dream a typical awakening from restful sleep? Not really. This type of occurrence delves into another topic outside the scope of this paper. Awakening from a dream-less sleep and aware of one's surroundings can perhaps be considered as an initial base-level of functional consciousness; it defines as nearly as possible a 'pure' *Humanoid* state, if such exists. This would now be one waking up and performing the rudimentary operations of stretching, standing, walking and urinating.

Next, we proceed to a more advanced level of *Humanoid* function like showering, teeth brushing and finally to the tasks of drinking coffee and eating breakfast. These behavior chain operations introduce an *Impler* component to the overall consciousness event. While eating, 'natural' mind-body operations occur that direct the body to manually transport the food from plate to mouth, chew, swallow and digest this food and drink to satisfy the body's metabolic needs. All these are the naturally programmed *Humanoid* functions requiring the minimum of natural level *Impler* functionality. An important level of Humanoid function is the act of squirming, crawling, standing, and walking, or otherwise physically moving the body across earth's surface. This requires not only the mind, but as noted earlier, the coordinated physical movement of the body and its ambulatory mind-set directing body parts to operate properly. Walking therefore, can be considered to be in the realm of being another of the body's natural phylogenic functions.

Rudimentary example of *Humanoid* functioning:

Let's now exemplify a higher level of *Humanoid-Impler* function by describing an act where someone is assigned to move a specific pile of bricks from one location to another. Let's position the example as a prison guard at a hard-labor prison facility ordering one of his inmates to move a pile of bricks from one place to another. The prisoner's *Humanoid* mind will listen to and follow these simple instructions. The prisoner does not have to know why he is doing this; all he knows is that he will be punished if he disobeys the order. The prisoner is well aware of being under the control of rule governed behavior. He knows too that solitary confinement is not a very pleasant experience. With this as background, all the prisoner wants is to complete the task so he can go back to his much more comfortable cell to relax from his hard-labor episode. While executing the task, the prisoner has heard and understood the simple order to move the bricks. Having had the experience of lifting, carrying and placing weighty objects from childhood and beyond, the prisoner's mind is already programmed and knows exactly how do perform this simple task.

The prisoner's *Humanoid*/*Impler* conscious faculty will now come into play. Following the prison guard's on-site instructions, the prisoner proceeds and 'blindly' follows through and proceeds on his given task. Other than the original instructions absorbed in the prisoner's mind,

no thought is needed or is required as to why this task is being performed. The prisoner's body and mind functions to carry out the task with little mental effort. His inherent physical strength and agility is guided by his pre-experience programmed mind. For analogy, let's consider a so-designed robot that is programmed to carry out this same brick-moving task. Here, isn't the prisoner basically operating in the place of the mechanical robot; the primary *Humanoidal* mode with some needed natural *Impler* mode operations, albeit somewhat repetitive *Impler*-mental action. Following, someone programming a mechanical robot machine and the prison guard would both have something in common. They are both functioning in simple *Impler* modes with minimum need for *Humanoidal* effort.

It is important to realize that humankind cannot ever function as an absolutely pure *Humanoid*. One may perhaps consider the elementary behavior of a newborn infant. Yes, highly *Humanoid* function oriented, but when the baby is hungry or is somehow uncomfortable, or lonesome, happy or otherwise needing attention, the baby's natural mind must invoke its Impler mode to start crying or perhaps smile with joy - - as primitive, natural response to its Humanoid/Impler goal, functioning toward achieving a goal. The baby gets fed, gets a diaper change, gets picked up and held by a parent - -these are the accomplishments the baby is seeking. In the operating functional consciousness of life, one always needs to invoke some level of *Impler*-mind guidance and control. What would a robot be without being suitably programmed to implement and complete a pre-set task? It would be a meaningless assembly of metal and electronic/circuits and parts taking up factory floor space; virtually worthless.

As the *Humanoid* operating human takes on a more complex task, more involved aspects of the *Impler* functional mode enter the picture. Going back to the prison-yard brick moving example, if you wanted to construct a brick wall with the moved bricks, it would take more than a low-level *Humanoid*/*Impler* level of functionally conscious person to accomplish the task. You would need an experienced brick-layer. The brick layer's mind is already knowledgeably programmed (from apprentice training and a long work experience) and has acquired mental and manual skills to fully and successfully implement this task. Bringing back the *Humanoid/Impler* prisoner example who originally moved the bricks to avoid punishment, the brick-layer's motivation was to receive compensation for his work: this is his job.

Overall now, the prison guard's *Impler* mode thinking went beyond just instructing the prisoner to move the bricks. The prison guard was planning ahead so as to get the bricks moved to a more convenient location for the pending brick-layer's work-project. The brick-layer's operation does not only consist of moving bricks, it involves moving and placing cement mortar at strategic positions in a 'growing' brick structure that would be secure enough so the brick structure remains in place while the mortar cures into a permanent brick-face wall. Furthermore, the brick-layer has to be building this wall structure from a pre-set plan-specification as contracted for through the building and construction contractor. Interpreting and following a set of construction plans certainly requires some *Impler* functioning by the bricklayer. Overall, from his experience, he would have to function in an *Impler*/*Humanoid* mode throughout the project. From this example, one can easily conclude that the mind-body exchange in this *Impler* mode operating bricklayer is more complex than the simple *Humanoid* mode operational brick-moving prisoner. Note too that the brick-layer person, while functioning in the *Impler* mode, must also employs his/her *Humanoid* talents to accomplish their focused brick wall creating task.

CHI modeling of athletes:

Let's now go on to examine the CHI profile of an athlete. It is assessed that all athletes function primarily in the *Impler* mode, with a very intimate, strong coupling with their *Humanoid* physical talent and abilities. Here, the athlete implements the varied tasks of executing the physical and mental action of playing the particular sport game. All athletes gain their expertise through a multitude of ontogenic behavioral experiences. Those who excel in their field of sport will possess natural physical and mental characteristics that amend themselves to playing the particular sport.

In baseball, for example, an infielder, outfielder, catcher, pitcher, batter, or runner, each has their own physical attributes to play their particular position. From learned experience, each has the unique role of "implementing" the game of baseball. From years of training, each player has honed their physical abilities and mentally stored experiences to gain an inherent familiarity with the characteristic intricacies of the played game. From repeat experiences, an outfielder will pretty much remember how a baseball will bounce off the outfield wall or how to play the ball in a certain corner of the outfield of his/her home ballpark. During the act of playing the game, athletes are merely doing what they do best–implementing the game of baseball employing all of their repeatedly practiced physical experience.

They are all functioning in a full *Impler* mode, employing all their *Humanoid* action/talent to carry out the needs of their assigned position. Players who excel in their execution of this *Impler/Humanoid* duality become the all-stars and hall of famers. With this set as the 'base', it seems that very little creativity is required to play sports. Only when the athlete confronts a new field situation will the instantaneity of creative action be needed. Now, if an athlete is requested by the team's manager to try out playing a new position on the team, the selected athlete will comply and find some nuances of the new position he/she has never before encountered. Some creative effort will be required to show the manager that his/her overall athletic ability is able (or not able) to handle the idiosyncrasies of this new position. Once the newness of this new position "wears off" the creative part of his/her functional consciousness becomes less and less prominent. Continuing with baseball, if a player has worked to create and develop a novel batting stance, or being a pitcher, their own pitching style, all to befuddle their opponent, this would require some creative thinking on the part of the player. In these cases, the use of the player's *Creaton* mode is voluntary as well as on some occasions, optional. Finally, what about the execution of rare plays in baseball, the triple play, unassisted double play, pitching a perfect game, pitching a perfect inning, and others. These are all rare events that not all players have had experience with. Are these all "creative" events? They may be 'first time events' for some players when it happens to them, but their knowledge of the game knows that such situations do indeed exist; in their own personal circumstances, they have a chance to execute a rare play when the occasion arises. For these players this would be a first-time creative experience. Once the player has logged such an event in their career, the creativity aspect of the particular event can no longer classify as a *Creaton* event for the particular player.

CHI interpretation of complex tasks:

Overall, the hierarchy of the *Impler* mode operation is defined by the relative difficulty and complexity of the task in which the *Impler*-person is engaged. For example, implementing the task of sending a special communication satellite into outer space requires more mental ingenuity and high-level academic training than, say, constructing a brick wall in a prison yard. The *Impler*-person heading up the space-launch project will be involved in mentally manipulating a huge amount of input data and information from others on his/her team. Great *Impler* planning goes along with this complex task. Questions will be asked and addressed. Many decisions will have to be made in implementing this space satellite project.

The *Creaton* functional mode in this satellite launching project can be said to have two levels of involvement: (1) It would be prior task-group design and engineering creativity. All novel ideas will have to be researched and developmentally worked out beforehand so that the project's risk levels are acceptable, (2) Creativity by the individual project manager must be kept to an absolute minimum. It would be extremely risky for the project manager to make creative, "on the fly" creative decisions; come up with and implement new ideas with no assurance of success. Therefore, for a rocket/satellite launch managing engineer, his/her *Impler* mode of functional consciousness must be steadfast in project decision-making since they would be dealing with very complex and indeed very broad-scope technical issues; there is no room for error in such an endeavor. Additionally, the project manager would also have to get involved with some humankind *Humanoid* mode functioning; writing notes, preparing reports, surveying the worksite, traveling to NASA headquarters and making a presentation, etc. A satellite launch project engineer has a tough job. It could only be handled by a person of high technological and intellectual functional consciousness skills where all CHI modes especially the *I* and *H* modes are operating.

***Creaton* functional mode:**

The final aspect of functional consciousness is the *Creaton* mode; one can refer to these *"Creatonic"* aspects as consciousness as being in the 'addendum' mode. This is because, for the most part, persons working in the *Creaton* mode usually do so as a free-will option. Their incentives are based on their own knowledge, curiosity, intelligence, intuition, persistence, internal drive, mind-acuity and memory to come up with solutions to unsolved problems or circumstances or answers to newly uncovered questions. One of the strong driving forces that provides motivation for a person to function in the *Creaton* mode is one's curiosity. Curiosity is an emotion possessed by all human beings but it is certainly not uniformly distributed in all. Persons can be curious about some things and not others. While the definition of curiosity falls outside the scope of this CHI model, it is certainly a part of humankind's overall behavioral consciousness.

Curiosity is a very real mental state or attitude of an individual as depicted in Figure 1. However, reasons for operating in the *Creaton* mode are not always dominated by one's curiosity. This being said, the *Creaton* functional consciousness mode has a hierarchy of cognitive involvement that can be classified as intangible and tangible. Daydreaming or having thoughts of being somewhere else or imagining enjoying being in another person's company, etc. are indeed a form

of creativity. These are all creative thoughts being generated out-of-the-mind to perhaps enhance one's mood. On the contrary, the conscious mental activity of worrying, causing a worsening of one's mood, can also be considered a creative function. Daydreaming and worry can be considered in the realm of non-tangible *Creaton* operations. This is because they cannot be clearly quantified by external accomplishment. Such simple, but real mental acts can be referred to as *pseudo-Creaton* acts that fall outside the realm of our CHI model. Alternatively, writers of fictional novels are special people that operate in a high level of "classical" *Creaton* activity. These authors have accomplished the tangible event of creating a book. They also have their minds geared to imagination, "what ifs", daydreaming or whatever is needed to weave a compelling story.

However, the event is carried one important step further, it is documented. The author sits at a word processor, typing away (*Humanoid/Impler* activity), recording their thought-line coming up with stories of life, love, mystery, and misery. They describe, in words, the feelings of the fictitious characters, including their predicaments and foils, all in an attempt to both entertain book readers and enhance their reputations as writers. Not all of us can be professional writers of fiction. In all of this there is, of course, some degree of *Humanoid* and *Impler* activity in these writers and all professional writer's operations; they have to manually type, correct, proof-read, and organize their literary creations.

However, these *Humanoid* and *Impler* acts are their means of physically documenting their work; this is but a fraction of their efforts of creative performance. Let's consider the highly *Creaton* dominated literary works of J. K. Rowling; the "Harry Potter" series of books are highly creative works. These books of magic, fantasy, and ghosts are pure creative fiction at its highest level. Books of creative fiction are usually written by one person who is in charge of making all the decisions. In many cases, little research is required in defining the nature of the characters. Of course, some fictional novels involve settings that involve political situations or are set in a certain (past or future) civilization time period. Here, the author must gain knowledge of the time period and the real-life circumstances that existed at the time and place of the book's setting. This must require some research by the author. Writing a fictitious book is very different from working in the field of non-fiction. In non-fiction literary works, such as auto-biographies, biographies, historical books etc., *the Impler* mode of functional consciousness is the prevalent mode. To have credibility, the story line must follow as accurately as possible, the results of the author's findings. They must be well documented; albeit, some of these findings may be subject to the author's creative interpretation.

The fields of research science/engineering, and medical research/discovery are all highly *Creaton* dominated professions. Here, curiosity is a strong driving force for creative accomplishment. This stance is easy to support if one considers the momentous accomplishments of historical masters of science like Galileo (telescope), Newton (classical physics), Faraday (electric motor/generator), Marie Curie (radio activity), Planck (quanta), Edison (invention), Einstein (relativity), Bohr (quantized atom), Townes (laser), Jarvik (artificial heart), Favaloro (coronary by-pass), Jobes (personal computers) and many others. These scientific, medical and engineering giants have shaped our world as we now know it. They have guided and determined our future. They all had to be very curious individuals and we are all grateful for their discoveries. They have all expanded our knowledge, bettered our lives and gave us a better

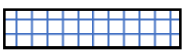
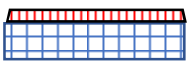
understanding of our Universe. Gigantic steps in the advancement of knowledge were achieved by these creative thinkers. There are many present-day research scientists, engineers, medical professional men and women that are carrying out their creative work leading to the continuing expansion of our technological horizons for the betterment of humankind.

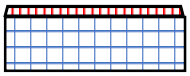
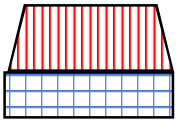
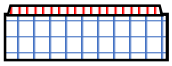
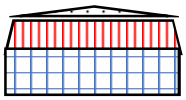
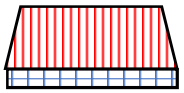
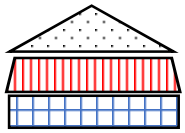
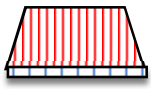
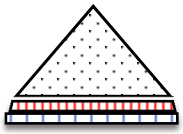
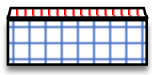
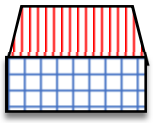
Iconic diagramming the CHI model:

To complete this discussion of the CHI model, Table 1 has been compiled to provide some rudimentary examples of CHI consciousness. Some new representative iconic symbolisms are introduced. This Table should be helpful in giving the reader a broader insight into the broad aspects of this CHI functional consciousness model. Note that in Table 1, all the CHI examples presented have been translated into a CHI letter symbolism and iconic symbolism generalized in Figure 1. Here, the sizes of the *Humanoid*-rectangle, the *Impler*-trapezoid and the *Creaton*-triangle are interpretations of the anticipated particular personal conditions and profiles described in Table 1.

In all cases, these symbols have been generalized. It is proposed that at any given instance in time, all functionally conscious persons can be described by these symbolisms. The shape of the icon continuously changes with time as the human takes on or is involved in performing a completely different task. Of special interest in Table 1 are the last two entries; a young man vs. an older man walking around the block. When a person is young, the process of walking requires practically no thought. No worries, care-free enjoying the scene, breathing the clean air enjoying the physical exercise. A non-thought *Humanoid* experience with natural instinct *Impler* mind functionally operating. The icon emphasizes the rectangular *Humanoid* operational mode. Alternatively, the elderly man, with a walking disability is another story altogether. His *Impler* mode must always be operating; some pain in each step, fear of stumbling, falling, some off-balance strides, anticipated obstacles in walkway are all possibilities. For the senior citizen, walking can require some, if not a high level of thought and concentration as to what is being done. Here the CHI icon reflects the high visibility of the *Impler* mind functioning mode. These Table 1 examples illustrate how this CHI icon profiles can change with the age and ability of persons; it also illustrates that the CHI icons are also task sensitive.

Table 1: Some Examples of CHI Profiles of Human Behavioral Functionality

Human Condition or Situation	Functional Activity	CHI Symbol	CHI Icon Shape
Physically, Irreversibly Dead	Not alive, not Conscious.	none	Not applicable
Comatose	Low functional Sub-conscious	h	
Dreamless Sleep	Functionally Altered Sub-Consciousness	h	
Dream/Sleep- Walk/Talk	Functionally Altered Consciousness	h/i	

Initial Awakening	Natural functioning, simple wake-up acts performed. [Possible base for 'pure' Humanoid Functionality]	H/i	
Driving to Work	Operational Impler functions	I/H	
Teaching Science Class	Same Lecture notes year after year. Could be replaced by video lecture series.	H	
Teaching Science Class	Fresh Updated Lecture Notes	I/H/c	
Student in Science Class Lecture	Inputting information to memory bank/writing notes	I/h	
Graduate Researcher	Delving into new scientific topic. New thinking required.	C/I/H	
Reader of Scientific Journal article.	Inputting new information into his/her memory bank.	I/h	
Physicist Stephen Hawkings (1942-2018)	Long time victim of ALS disease. Functioning in almost 'pure' Creaton mode.	C/i/h	
20-year old person walking around the block	Physically fit with spirit of viral youth	H/i	
85-year old person walking around the block	Waking on his own. Has a painfully arthritic right knee and ankle but manages.	I/H	

(a) CHI symbolisms:

- All larger size font and higher case letters denote more emphasis
- H = *Humanoid* -physical body motion (Rectangle)

- I = *Impler* -implementing goal-oriented tasks (Trapazoid)
- C = *Creaton* -creative thinking, no precedent background (Triangle)

These Table 1 entries demonstrate the overall breadth and versatility of the CHI model. As noted in Figure 1, the CHI model specifically applies to only the functional part of the consciousness spectrum. While the emotional, recall and societal aspects of consciousness are always operating during all activities of human consciousness, the physiology and brain science of personal emotion, recall and societal interaction are not necessary in describing the tangible nature of functional consciousness as defined in this paper. While the proposed CHI model inherently involves all facets of consciousness, it only focuses on the goal-oriented aspects of humankind's conscious behavior and accomplishment.

In summarizing the theme of Table 1, it must be noted that the iconic representations presented depict only a single specific segment of a particular human's FC lifetime episode(s). These icons describe the CHI character of only a single event in the awareness state of a human agent performing the described human function. In reality, a human's daily accomplishments are not characterized by a single, specifically defined CHI task. A person's daily routine is a dynamic continuum of separate, individual types of iconic-ally describable CHI events. From an initial awakening, having breakfast, driving to work, teaching a science class, having lunch, correcting exams, interpreting experimental data, working on writing a scientific paper, driving back home from a day's work, enjoying dinner and relaxing before bedtime - -these are all different, individual, continuously flowing CHI events that can each be described by individually characteristic icons.

This particular example listing, of course, describes activities that would typify the FC, operational life of a University (science) Professor. This University Professor example is of course only one of a virtual infinite number of functionally conscious humans that can be described by CHI icon pattern sequence. The CHI model applies to all of humankind; every living and FC human being. In fact, every awake and alive human has their own sequentially connected, dynamic series of characteristic CHI events during their lifetime awake hours. Again, each of these awake and alive segmentally distinguishable CHI humankind events are focused on achieving a single self-serving goal or accomplishment. This establishes the basic overall universalistic nature of the CHI model.

Conclusions

Let it be emphasized that the proposed CHI model of FC is meant to describe only one aspect of the broad field of human behavioral consciousness. The CHI model's place in the spectrum of consciousness is noted in Figure 1. From this viewpoint, the authors have concluded that humankind's FC can be defined in terms of three somewhat easily describable human-operational modes. The basis for this conclusion comes from the overt realization that the functional behavior of every awake person can be classified by being involved in three types of mind and body operational behaviors during their everyday experience. In some ways, this CHI model could also be called a *Cognizable Model of Consciousness*; there are certainly some clear, identifiable aspect to it. Regardless, in humanizing this CHI model, there are some individuals

whose demeaner and mannerisms are characterized with a propensity or preponderance of functioning solely in only one of these three modes. You may have encountered persons who seem to be able to operate only as "manual robots" (*Humanoid* function); these people need very explicit instructions and guidance to accomplish anything.

Alternately, there are others having the natural talent of managing and smoothly executing and completing a task. Some persons of this characteristic may wish to or are only capable of sitting at their desks, directing other persons in their quest for accomplishment. Others are always willing to work with and carefully instruct others to carry out their assigned tasks. These types of people are the leaders, "bosses" and are *Implers*; managers of an accomplishable task. Many of these *Impler* people are also capable of "rolling up their sleeves" to manually participate at the *Humanoid* level and can physically contribute to the accomplishment. In the context of societal fit, these type people are the business managers, manufacturing managers, political leaders, rally organizers and sport team captains, etc.

Finally, there are other person types capable of thinking beyond the routine, established, banal ways of doing things. These are the *Creaton* minded people. Creative persons are of many types, from writers, to inventors, to theorists and overall curious thinkers. It is now important to reiterate that any healthy and operational persons can function by operating in all three modes to varying degrees when accomplishing a task. Some people have a preponderance of operating in only one particular CHI mode. There are others who comfortably function in all three CHI modes. Generally, most people will naturally function in all three CHI modes with being more comfortable operating in one of these modes with less involvement employing the others. Their operating mode will depend on the task at hand. In reality however, there will always be a CHI emphasis/change mix when a particular task is being carried out. Also, one's CHI profile can/will change with time and age as factors such as education, experience and changes in societal connection enter the picture.

Overall, consciousness is a holistic/human brain/mind/body activity. As noted earlier, FC, as defined in this document, represents only part, albeit an important part, of the broad scope of consciousness studies. As said earlier, FC may also have a cognitional component to it. In the CHI model, a human's functional consciousness involves the brain/mind/body complex operating within three distinct modes with the intent of accomplishing a planned focused task or state of accomplishment.

It is scientifically important that any new proposed scientific model or theory provide a means for experimental verification; without this, they could be considered useless. Since the senior author (AFL) of this document was professionally trained as a material scientist/chemist, he sees everything as a physical entity; a physical entity that one can see, hold, weigh, dimensionally measure, or otherwise determine and understand with respect to a material's chemical composition, textural morphology and mechanical properties. This being said, it's clear that the complete realm of human consciousness has none of these attributes. Some means of scientifically establishing the physiological/brain chemistry aspects of this CHI model may be possible. In view of this, the brain remains as one of the largest and most complex organs in the human body. It is a flux of trillions of communicative connections called synapses.

It is known that the brain is made up of several specialized areas that work together as what can be called the body's CPU (Central Processing Unit). For example, the outermost part of the brain is called the cortex which controls thinking and voluntary, natural body movement. The brain stem controls our breathing and sleeping function. In the center of the brain, the basal ganglia coordinate messaging between other brain parts. The cerebellum is responsible for body coordination and balance. The thalamus is the part of the brain that relays sensory and motor signals to the cortex regulating sleep, consciousness, awareness and alertness. Furthermore, to investigate these brain functions, neuroscientists and brain researchers have the following instrumental and procedural techniques available: CT (Computed tomography), MRI-scan (Magnetic Resonance Imaging), Angiography- contrast agent injections followed by X-Ray imaging of the brain, MRA (Magnetic Resonance Angiography), Lumbar puncture (spinal tap) fluid studies, EEG (ElectroEncephaloGram) brain activity is monitored, Neurocognitive testing and Brain biopsy [Hoffman-2014)].

Perhaps the functionality of humans in terms of the *Creaton*, *Humanoid* and *Impler* modes can be identified through deliberately staged brain activity imaging experiments. Such a study would be procedurally difficult, but not impossible. The human subjects for such a study would have to be very carefully selected. Over the past decades, a plethora of information has been generated on brain body/mind function. All these studies have had a specific purpose. Perhaps planning and focusing a brain/mind-body study on the CHI model components would be able to establish the model's foundational nature. Psychologists, neuroscientists, behavioral scientists, medical imaging specialists, and social scientists would need to collaborate to plan and execute such a study. To suggest a plan, for example, the *Humanoid* level could be established by measuring a person's brain activity at a first-awake-from-sleep stage. Next an *Impler* brain pattern could be obtained by examining the brain patterns of the same "first-awake" person by asking him/her to physically write down, from memory, some instructions on how to conduct an experimental procedure that could be carried out based on a familiar topic in his/her field of study. Continuing, *Creaton* brain patterns could perhaps next be obtained from the same "first-awake" person who would be given a deliberate, outside-the-box thought experiment on a topic familiar to the "first-awake" person's basic field of science. Brain patterns from these various functional operation conditions or circumstances can now be compared. Would differences in brain pattern be observed? Could these differences in brain pattern be correlated with the three CHI functional modes? If found, what do they mean? Are they characteristic? Will these observed brain patterns be able to establish a pattern linking the three modes of CHI functional consciousness? This experimental plan is for illustration only. The exact planning and execution of such an experiment is way beyond the scope of both author's expertise. The suggestions here are to illustrate the possibilities of planning and starting a study to verify the foundational nature of the CHI model.

In closing, it has been shown that the functional aspects of consciousness can be distinctly separated as part of the very broad field of human consciousness. This is a separation away from consciousness's reality of mind, non-physical intimacy of emotion, memory, feeling, intuition, opinion, pain etc. In this context, the question arises as to how might this CHI model concept fit into the field of Artificial Intelligence (AI)? Some have claimed that the Block "Phenomenal-Consciousness" model fits into the framework of AI [Schkolne-2018]. In view of this, might the CHI model also be viewed as a means of defining the "consciousness level" of AI devices.

Objectively, it could be said that robots already exist that have an AI level equivalent to the functional-duo *Humanoid*/*Impler(H/I)* modes. After all, aren't mechanically-operating, industrial manufacturing assembly-line robots designed to operate at this *H/I* level of FC and are designed to accomplish a goal? Generally, the motivational purpose of all manufacturing line installed robots is to replace the *H/I* function of a human worker. Human physical assist robots also directly serve the needs of the disabled human. In these manufacturing-line operations the level of AI involvement would of course depend upon the complexity of the "*Humanoid*/*Impler*" operational task to be performed; how the robot is programmed to carry out its task. Now that the clear connection between the *Humanoid* and *Impler* mode has been made, how does AI fit in with the *Creaton* mode? This of course is where AI faces a difficult challenge.

While these assembly-line robots most likely have been programmed to "weed out" stray, off-specification "products", what happens when the robot encounters a non-programmed contingency? Can robots be programmed to think "outside-the-box" to solve such problems when encountered? Isn't this the crux of what presumably AI is all about? The fear of AI computers or robots taking over the world is now part of our culture with this being the theme of some present-day science fiction movies. With this as background, perhaps the field of AI studies should look at employing the rudiments of the CHI model as a means of categorizing the level of AI a computerized robot or computer system can or has achieved. The CHI model might, at lease, provide some guidance, standardization and definition in their approach to the subject of a machine's AI.

In other words, if robots can ever be designed with a conscience, it might indeed be possible for these future robots to achieve an intelligence level of functional consciousness as described by the full CHI model. Using this approach, the important (intangible) aspects of consciousness such as emotion, intuition and 'feelings' would not enter the picture. Will science and technology ever create a sentient robot or computer? The start of such a trend might be to first focus on developing a robot/computer that would have CHI qualities to some degree. This suggestion in itself may prove to be the most valuable merit of this proposed CHI model. Finally, it seems likely that the framework of this CHI model could also be applied to the animal world. In the animal kingdom, one would expect the FC of animals to be more in the *Humanoid* and *Impler* dominated realm by functioning in the survival/predator/victim mode with the *Creaton* mode being a possibility; certainly, an interesting subject worthy of further study.

About the Authors

Armand F. Lewis: Holds a Ph D. Degree in Chemistry from Lehigh University- 1958; has 25-year experience as a Research Chemist at Cytec (American Cyanamid), Lord Corporation and Kendall Company) and 10 years of University teaching experience (Pennsylvania State University-Behrend College -Materials Science, UMass Dartmouth -Textile Chemistry). From 2000 to present, Dr. Lewis has been an Adjunct Professor in UMass Dartmouth's Bioengineering Department and participating as a research adviser to undergraduate and graduate students. He is actively involved in proposal, patent activity, report and publication writing. Dr. Lewis has over 100 publications and 20 patents to his credit in various fields; polymer material science, dynamic mechanical properties of polymers, bio-filtration and most recently in impact energy absorbing textile materials. He has always been an avid reader of non-fiction in the fields of quantum physics, cosmology, and consciousness studies and biocentrism. The

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Kyle A. Lewis: Has a joint B.A. Degree in History/Political Science with a minor in Philosophy. In 2011, he graduated Magna Cum Laude from the University of Pittsburgh-Bradford, PA. Kyle is a Board-Certified Assistant Behavior Analyst and is currently enrolled in the Organizational Behavioral Management Program through the Florida Institute of Technology. Kyle has spent the last 7 years working with children and adults diagnosed with Autism Spectrum Disorder and other intellectual disabilities. He is presently employed at a private school (New Story, Monroeville, PA) as a Behavioral Supervisor. Kyle has interest in philosophical issues related to human behaviorism and consciousness.

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