

# CLQ

## Culture Level Quotient

### Synapses

The oldest recorded culture is morality 2,500 years ago. Technically, morality provides guidance to human behavior without stating the conditions under which the moral principles should be followed. Religion is the culmination of morality and gives all the conditions of human behavior, but is unable to relate these conditions to the guidance to behavior. Current dominating culture, science, relates all the conditions deterministically, but applies only to the physical world with non-violable laws of nature in science. Social science of the next 500 years relates all the conditions deterministically and extends the application of the guidance to human behavior with non-violable laws of nature in social science. Science deals with 5 variables, social science, 50, and life science 500. Solutions in science are accepted based on empirical verification. Due to the involvement of infinity in social and life sciences, empirical verification is not possible in social and life sciences, for, by definition, infinity never arrives. Solutions in social science are accepted based on complete mathematical rigor, making mathematical training a pre-science culture. Solutions in life science are accepted based on complete logic, making logic or philosophy a pre-life science culture. The attempt to self-creating humans starts with humanoid robot with the ability of touch, which is the ability for the robot to come into contact safely with the uncontrolled environment and, thus, should be the definition for robot. Self-creation involves the improvement of the robot to become the human and the improvement of the completely automated software, which develops and controls the robot, to become DNA. In 3000 years, the basic framework for the culture of self-creation is complete with the realization that self-creation is the purpose of existence, for what is self-created can do anything the creator can do. The design specification of self-creation will reveal the meaning of life and the purpose of existence. From the basic framework of self-creation, fuzzy logic will be needed to study the fuzzy reality, resulting from the sacrifice of precision in order to expand the range of tolerance of the created to survive and flourish for all the possibilities of an uncertain future into the last of the next 4000 years. Fuzzy logic adds the study of the range of tolerance to that of conditions and, thus, opens up a completely new field of knowledge, advancing knowledge from exact solutions to fuzzy solutions with tolerance. Commercially, social science in post-science fuzzy logic is represented by the Infinite Spreadsheet, which will absolutely dominate real estate and stock predictions. Life science is represented by Universal Permanent Number, which, as a byproduct of completely automated software, assigns permanently and globally unique integer names to all the permanent entities and is the first step in big data. Robotics is represented by the Jumpulse Mechanism, which will help a nation dominate sports and robotics with the solutions of prolonged contact and of touch. Self-creation and fuzzy logic are too advanced for the current society, but endorse Permanent Life based on health, bioethics, and human cloning.

## *Abstract*

The world is changing for the purpose of progress. It is important for a person, a people or a nation to know the direction and the desirability of the change. A comparison of different cultures and knowledge advancements around the world and cultures throughout history provides some guideline for the change. From the perspective of the knowledge advancement of the historical past and the post-scientific vision of knowledge of the expected future, the concept of culture can serve as an overall measure of the quality of a person, a people or a nation. One's beliefs can provide indications to one's cultural level. The knowledge vision of post-science fuzzy logic extends 4,000 years into the future and can serve as a guide to the cultural development of the future. 2,000 years ago, morality culminated in religion, which dominated human culture in the West for over a millennium and was taken over by science in the past 500 years. Rigorous training in mathematics is needed in the next 500 years for social science, which involves the infinite future and is, therefore, not subject to empirical verification, for the infinite future will never arrive. The acceptance of solutions in social science depends on complete mathematical rigor. Rigorous training in logic is needed in the next 1,000 years for the unlimited complexity in life science, which deals with the creation of permanent entities, such as DNA, and whose solutions are accepted based on complete logic. The Age of Robotics will occupy the next 1,000 years, when robots will be intelligent machines with the capability of interact safely with uncontrolled environments. The Age of Self-Creation from 4,000 AD to 5,000 AD will reveal from the design specification of mankind's self-creation the meaning of life and the purpose of existence. Post-Science Fuzzy Logic will occupy from 5,000 AD to 6,000 AD and will sacrifice precision in the process of expanding the range of tolerance of a creation in order for the creation to survive and flourish for all the possibilities of an uncertain future. The total of 6,000 years of recorded history will enable mankind to establish a new religion based on knowledge, replacing the supernatural beliefs of the current religion.

## **Introduction**

Culture Level defines and Culture Level Quotient (CLQ) measures a person, a people or a nation. Cultural Level Quotient identifies the sum total of a person's cultivation in life; it is a measure of the whole person. CLQ is fuzzy in order to allow tolerance in measurement and change from low to high. Cultural diversity is the process of human progress. Currently, CLQ is intended as the sum total of the measure of Intelligence Quotient (IQ), Emotional Quotient (EQ), Wealth Quotient (WQ), Happiness Quotient (HQ), Cultural Quotient (CQ), etc. Post-science fuzzy logic classifies CLQ based on the vision of knowledge of the past 2,000 and the future 4,000, as well as on CQ, which deals with the currently existing cultures around the world. For example, an individual or a community, but not a nation, can have CLQ as advanced as 4,000 year into the future, such as the Post-Science Fuzzy Logic Team, whose CLQ spread from social science of the next 500 years to post-science fuzzy logic, a vision of knowledge 4,000 years ahead of the current science.

Briefly, culture advances from simple to complex with increasing rigor for handling the increased complexity. In the past 2,000 years, cultural progress is based mainly on common sense, which

involves roughly 3 variables, except that science exposes mankind for the first time knowledge based on uncommon sense, in the form of precise observations. In the next 4,000 years, knowledge discoveries will be based on uncommon sense. Outside of post-science fuzzy logic members, few people have understanding of cultural level in the next 4,000 years. Post-science logic can present a test of a person's cultural level by the following indications, not definitions, for each cultural level at and beyond the current cultural level of science.

500 BC - 0 AD Morality: Knowledge against excessive evil.

0 AD – 1000 AD Religion: The culmination of morality; knowledge becomes mature.

1000 -1600 Pre-Science: Knowledge based on common sense without precise empirical verification.

1600 – 2100 Science: A scientist is a person who dismisses all the current solutions in social science.

1600 – 2200 Pre-Social-Science: A mathematician is a person who thinks scientists are religious fanatics believing in laws of nature based on observation.

2000 – 2500 Social Science: A social scientist is a person who can solve problems in social science with complete mathematical rigor. Today, most solutions in social science do not have mathematical rigor, and most mathematical solutions do not correspond to reality in social science.

1600 – 2600 Pre-Life-Science: A computer scientist is who tries to replace philosophy with computer science, but is still far from claiming victory.

2500 – 3000 Life Science: A life scientist is one who can solve problems in life science with complete logic or can program life with 0, 1, 2, and 3 of the basic code of DNA. Today, the computer is a logic machine, but its logic is not complete, and the human represents a completely rigorous system, being, in particular, completely automated.

3000 – 4000 Robotics: A robot is defined as an intelligent machine, which can safely interact with its uncontrolled environment.

4000 – 5000 Self-Creation: The robot is being developed into the human, and the completely automated software, which develops and controls the robot, into DNA.

5000 – 6000 Post-Science Fuzzy Logic: A post-creational technology used to expand the range of tolerance of the creation with the sacrifice of precision in order to survive and flourish all the possibility of an uncertain future.

6000 – 12000 A new religion based on knowledge, not supernatural observations, will be established to replace the old religion centering on the reduction of excessive evil.

12000 and beyond: Imagination; augments reality; alien visitation; universal community

## Summary and Significance

This article traces the advancement of human culture in terms of knowledge from 2,500 years ago to the next 4,000 years, in particular reference to the cultural advancement of Chinese and the Western civilizations. Technically, this article by Hugh Ching, the Father of Post-Science, exposes the gross defect in the very foundation of computer science and life science, both of which should share the same foundation of complete

automation achievable by separating the fuzzy and the exact operational components. It explains why reality is fuzzy, not exact, and claims that fuzzy is actually more accurate than exact. Mathematically, the most accurate description of reality should be the Fuzzy Exact Solution, not the current Exact Solution. Quoting from the article: ***“The greatness of Lotfi A. Zadeh can be realized from the ubiquitous effect of fuzzy logic on all knowledge that, henceforth, a solution should be defined as all the answers, which lie within the fuzzy range of value or tolerance of the solution.”*** The article gives a detailed technical description of the theoretical discovery in 1986 of DNA as completely automated software based on quaternary number system versus the discovery of the structure of DNA in 1953. It concludes with a chronological speculation on the progress of human culture based on knowledge for over 6,000 years from the down of human civilization 2,500 years ago to the post-creational culture of fuzzy logic based on the sacrifice of precision in the expansion of the range of tolerance in order to survive and flourish for all the possibilities of an uncertain future. Each reader would be able to measure one’s own cultural level with this cultural yardstick based on one’s knowledge of morality, religion, reason, science, social science, life or computer science, robotics, self-creation, and, finally, in 4,000 years, fuzzy logic, all of which are contained in a speck of DNA representing the wisdom of the universe accumulated from the infinite past.

### ***Fuzzy Logic: The Genius of Lotfi Zadeh, the Father of Fuzzy Logic***

Lotfi Askar Zadeh was the father of fuzzy logic and, according to many, was mankind’s most renowned thinker. The greatness of Lotfi A. Zadeh can be realized from the ubiquitous effect of fuzzy logic on all knowledge that, henceforth, a solution should be defined as all the answers, which lie within the fuzzy range of value or tolerance of the solution. Fuzzy logic, a post-creational technology, has helped propel human knowledge forward thousands of years, far beyond scientific and post-scientific applications.

### **Understanding Fuzzy Logic: The Most Advanced CLQ**

The key to fully appreciate CLQ is to understand fuzzy logic, which touches all fields in post-science, knowledge beyond science, dealing with social and life sciences. Understanding fuzzy logic involves answering two important questions: 1) Why is reality fuzzy? and 2) When is fuzzy logic necessary?

Reality is fuzzy because precision is sacrificed during the process of expanding a creation’s range of tolerance. Whether that creation is a human being or a washing machine, for it to survive and flourish in a permanently uncertain future, fuzzy logic becomes necessary and essential when the creator is absent.

While engineering deals with the construction of temporary entities, life science pertains to the creation of permanent entities. From a post-science or universe-centered point of view, engineering should not be considered as life science, because any temporary creation will sooner or later become valueless. When an engineering product e.g., a driverless car, encounters an unforeseen issue, its human creator, or the driver, can still intervene to manually correct the problem. However, the human being or the entire living system must be able to survive in the absence of its creators. All of the possibilities of the future must be considered in the design of the living system. Furthermore, the future must not be left to chance or probability, for probability deals with certainty; a probabilistically designed living system will eventually perish.

From a technical point of view, the range of tolerance of the living system must be wide enough to cover all of the possibilities of a permanently uncertain future. This range of tolerance or expansion in synthesizing emotion or distorting reality could be considered the ultimate psychological defensive mechanism against failures. For example, emotional quotient (EQ) is a measure of the range of tolerance of others' mistakes. Survival is more important than precision; therefore, precision is sacrificed during the process of expanding the range of tolerance of a creation. As a result, fuzzy technology, while post-science, a creational technology and science, a nonliving technology. Engineers currently working on fuzzy logic have successfully tested the concept of the range of value or tolerance on temporary or nonliving products, and their findings indicate that only when the originator is no longer available, is fuzzy logic necessary.

The previously described questions and answers, and their implications, are what separates Zadeh and his devotees from the rest of the world, as well as from the fuzzy logic community. For scientists who have developed the practice of, and are accustomed to being exact, fuzzy logic can be difficult to understand. To fully appreciate fuzzy logic, post-science, which deals with the solutions of value, complete automation, and robot touch, all of which involve fuzzy logic, must first be understood.

## **The Concept of Fuzzy Logic**

Fuzzy logic is best summarized in one short sentence: Fuzzy is more accurate than exact. Fuzzy logic has raised the ceiling on mathematics by replacing the mathematical concept of exact solution with "fuzzy exact solution," as the most accurate description of reality. In logic, fuzzy logic offers an operational definition of computer science that states, "computer science is the communication between the fuzzy human and the exact computer." In life science, the exact deoxyribonucleic acid (DNA) generates a living system that has sacrificed precision as the range of tolerance of that living system is expanded in order for it to survive and flourish given all of the possibilities in a permanently uncertain future. Even though recognition should be given to all of the visionary thinkers contributing to the pioneering evidence that fuzzy logic is useful in

engineering, the full significance of fuzzy logic will only be revealed when applied directly to the living system, far advanced then the current engineering and science.

With the passing of Zadeh on 6 September 2017 fuzzy logic will enter into a new era. Applications from engineering based on science will advance into applications in life science based on cognitive science, artificial intelligence (AI), synthetic biology, and post-science, whose solutions of value, complete automation, and robot touch is naturally fuzzy (not exact), while solutions in the current age of science are exact. Zadeh, therefore, has established a solid technical foundation for describing the fuzzy reality with his founding of fuzzy logic, specifically in the areas of range of value or tolerance, possibility theory, and the general theory of uncertainty, all of which form a completely logical system that explains why reality is fuzzy. Unfortunately, fuzzy logic will become necessary only after we are all dead. Additionally, Zadeh spearheaded the invention, the explanation, or the foundation of the following ideas and theories: **Z-transformation, common sense, decision theory, free will, computing with words, Z-number, membership functions, the restriction-centered theory of truth and meaning, fuzzy sets, fuzzy numbers, fuzzy mathematics, soft science.**

The most convincing argument for creationism as opposed to random evolution, are the discoveries of post-science and fuzzy logic. In particular, post-science has identified DNA as a completely automated software; therefore, the living system can be manufactured when DNA is programmed using just the computer source code 0, 1, 2, and 3. Post-science demonstrates the feasibility of mankind's self-formation, which, in turn, demonstrates that mankind is self-created. The fact that reality is fuzzy rather than exact provides one of the most convincing arguments in support of creationism. Universal permanent software (UPS) can be considered a theoretical discovery of DNA by identifying DNA as self-generating software, which should be considered even more significant than the 1869 discovery of DNA's existence, as well as the 1953 experimental discovery of DNA's structure, because the theoretical UPS connects mankind to its creators and to the universal community [1]. The theoretical discovery of DNA leads to a change in the representation of DNA nucleotides, from *A*, *C*, *G*, and *T* (which have no operational significance), to 0, 1, 2, and 3, to allow a parity check of 3s and other logic operations. DNA is quaternary versus binary for the computer, as illustrated in Table 1. Computer science manages the interaction between the fuzzy human and the exact computer, and computer software automates knowledge. Concurrently, the UPS completely automates software. It starts with a universal user interface (UI) that is arranged in a simple tree-structured, numerical multiple-choice question format. In the case of DNA, the UI can be written for all three levels as: 1. adenine (*A*), 2. cytosine (*C*), 3. guanine (*G*), and 4. thymine (*T*)?

TABLE 1 – THE THREE DIGITS OF QUATERNARY DNA AND BINARY COMPUTATIONAL REPRESENTATIONS.

	Quaternary	(Decimal)	DNA		Binary	(Decimal)
Third Digit	Second Digit	First Digit		Third Digit	Second Digit	First Digit
3 (=48)	3 (=12)	3 (=3)	T			
2 (=32)	2 (=8)	2 (=2)	G			
1(=16=4 <sup>2</sup> )	1 (=4=4 <sup>1</sup> )	1 (=1=4 <sup>0</sup> )	C	1 (= 4=2 <sup>2</sup> )	1 (=2=2 <sup>1</sup> )	1 (=1=2 <sup>0</sup> )
0 (=0)	0 (=0)	0 (=0)	A	0 (=0)	0 (=0)	0 (=0)

The integers 1, 2, 3, and 4 are to be the answers to the questions and will form the integer source code to be handled by the computer. For example, choosing 1, 1, and 1 for the three levels will lead to the codon 111 or AAA = lysine. The human language expressions adenine (A), cytosine (C), guanine (G), and thymine (T) are to be read by humans, and they can be changed into, say, Chinese to form a UUI for the Chinese, such as: 1. 腺嘌呤 (A), 2. 胞嘧啶 (C), 3. 鸟嘌呤 (G), and 4. 胸腺嘧啶 (T)? Or, the order of the integer choices can be altered to form a new UUI, such as: 1. thymine (T) 2. cytosine (C), 3. guanine (G), and 4. adenine (A)? The UPS patent [1] has shown that the UPS can automatically update the old source code 111 to the new source code 444, as has been demonstrated in the virtual machine. UPS can be considered a novel use of an old idea, i.e., the virtual machine. The novelty is complete, rather than partial, automation.

DNA is a chemical generator that generates protein by feeding RNA into ribosome; in fact, DNA is so powerful that it makes its host modify the function of DNA according to the behavior of the host (i.e., according to its lifestyle). Post-science believes that DNA, with its inherent wisdom, dominates the universe, while 0, 1, 2, and 3 correspond to computer source codes in computer science. The source codes are used to generate the program, which corresponds to protein.

The user interface of any programming language can be converted manually to UUI, and UUI can be completely automatically updated to any other UUI. Furthermore, using the self-generating feature of UPS [1], UUI can be converted to any human native language or any multimedia expression. Thus, the greatest practical contribution of UPS to the progress of human knowledge is to allow all humans over the age of 6 or even some intelligent animals or robots, and aliens from outerspace to write software, which will not become obsolete as the programming language changes.

UUI corresponds mathematically to the set theory, which allows similar items to be grouped into subsets in lower levels of UUI, and corresponds physically and cognitively to the Human Associative Memory (HAM), which allows humans to access an unlimited amount of information, but is fuzzy. The human native language in UUI is permanently fuzzy, but isolated from the execution of UPS. An obvious choice of an UUI corresponding to Table 1 can be written for all three levels of UUI as 0. adenine (A), 1. cytosine (C), 2. guanine (G), and 3. thymine (T)? And lysine (AAA) can be represented by the integer 0. DNA source code in the form of 0, 1, 2, and 3 can be directly fed into the UPS to generate the representations of the 64 codons or any protein.

Demonstration is available to show that UPS can self-generate to form a self-generated neural network of software cells of unlimited size, or until the disk is full. The self-generated network can eventually be developed into an electronic brain, with features, such as Human Associative Memory or HAM. Thus, in the design of a self-generating completely automated intelligent system with unlimited complexity, such as the living system and a completely automated computer system, HAM is needed to create HAM. Even today, the usefulness of HAM, possibly without being fully recognized by the current computer designers, has been amply demonstrated by the computerized hypertext system, the computerized menu system, the computerized library system, all of which enable their users to theoretically access unlimited amount of information, but have not yet incorporated the completely automated capability of UPS [1].

## CLQ Chart

The following is a CLQ Chart for the convenience of measuring CLQ. The CLQ Chart is fuzzy covering a range of levels rather than a single level.

**CLQ Level 0:** 500 BC - 0 AD **Morality** to 0 AD – 1000 AD Religion (500 BC – 1000AD)

**CLQ Level 1:** 0 AD – 1000 AD **Religion** to 1000 -1600 Pre-Science (0 AD – 1000 AD)

**CLQ Level 2:** 1000 -1600 **Pre-Science** to 1600 – 2100 Science (1000 – 2100)

**CLQ Level 3:** 1600 – 2100 **Science** to 1600 – 2200 Pre-Social-Science (1600 -2200)

**CLQ Level 4:** 1600 – 2200 **Pre-Social-Science** to 2000 – 2500 Social Science (1600-2200)

**CLQ Level 5:** 2000 – 2500 **Social-Science** to 1600 – 2600 Pre-Life-Science (1600-2500)

**CLQ Level 6:** 1600 – 2600 **Pre-Life-Science** to 2500 – 3000 Life Science (1600 – 3000)

**CLQ Level 7:** 2500 – 3000 **Life Science** to 3000 – 4000 Robotics (2500 – 4000)

**CLQ Level 8:** 3000 – 4000 **Robotics** to 4000 – 5000 Self-Creation (3000 - 5000)

**CLQ Level 9:** 4000–5000 **Self-Creation** to 5000–6000 PostScience Fuzzy Logic (4000 -5000)

**CLQ Level 10:** 5000–6000 **Post-Science Fuzzy Logic** to Religion of Knowledge (5000-6000)

**CLQ Level 11:** 6000-12000 **Religion of Knowledge** to Unknown Future (12000 – ?)

12000 and beyond: Imagination augments reality. Alien visitation; Universal community

## Conclusions

The method of solving problems defines the cultural level of the people. Fuzzy logic is the most advanced method discovered by mankind up to now. The advanced nature of fuzzy logic can be described by a speculation of the future chronological order of the progress of human culture described below and summarized in Figure 1 and Figure 2.

**500 BC – 1500 AD:** The method is faith. Faith is applied to morality, which deals with beliefs favorable to the believers, and to religion, which is the sum total of morality. Morality provides temporary comfort and stability and culminates in religion, which becomes addictive and considered by Marxism as the “opium of the masses.” Morality stabilized the Chinese culture for 2,000 years, and religion creates the stable Dark Age lasting over 1,000 years in the West.

**1500 – 1800:** The method is reason (*End of Common Sense*). Reason does not change anything; reason is just viewing the same phenomenon or conclusions from different perspectives. Mathematics and logic provide examples of reason in its most advanced form. Mankind, without the stability of morality and religion, enters into the most painful period in history exemplified by the French Revolution, WWI, and WWII, as reason cannot settle disagreements.

**1800 – 2100:** The method is empirical verification. The scientific method is based on empirical verification, and science currently dominates human culture and the knowledge of the establishment. Science provides a cultural shock to China waking it from 2000-year morality.

**2100 – 2500:** The method is complete mathematical rigor. Solutions in social science deal with reality in its entirety. Reality extends to infinity in space and into the future. Since infinity, by definition, never arrives, deterministic set of data for empirical verification can never be obtained when infinity is involved. The solutions in social science are accepted based on complete mathematical rigor. In particular, the solution of value is a completely mathematically rigorous system, which corresponds to the price system and is the solution to financial crises. The solution of value will replace completely morality and religion by offering quantitative solutions to their problems. While doctrines in morality and religion are violable, the solution of value is non-violable and is a law of nature in social science governing human behaviors.

**2500 – 3000:** The method is complete rigor in logic. Solutions in life science, due to their unlimited complexity, cannot rely on the imprecision of mathematics, due to decimals and fractions, and must be confined to the rigor of logic, represented, for example, by integers. Involving infinity, the solutions in life science are accepted based on complete rigor of logic. For example, the solution of complete automated software should be the foundation of life and computer sciences, is a completely logic system, involving self-generation, auto-updating, and auto-documentation. Complete automation is the ultimate solution to unlimited complexity.

**3000 – 4000:** The method is complete automation. Complete automation is achieved with Self-manufactured General-Purpose Robot capable of safely interact with the external physical environment with the ability of touch and is developed and controlled by the completely automated software. The solution of touch is based on the Fuzzy Jumpulse Mechanism.

**4000 – 5000:** The method is self-creation. What is self-created can do anything the creator can do, thus, eliminating the creator. The design specification of self-creation reveals the meaning of life and the purpose of existence. The Robot will become the human, and software, DNA.

**5000 – 6000:** The method is fuzzy logic. Precision is sacrificed in the expansion of the range of tolerance of a creation to survive and flourish for all the possibilities of an uncertain future. For example, common sense, which is the most important human ability for survival, is fuzzy. Other fuzzy logic examples are multi-cellular design for ultimate fault tolerance and bio-diversification.

# Culture Level Quotient (CLQ) and Representative Thinkers

Culture Level (CLQ includes all the past cultures.)

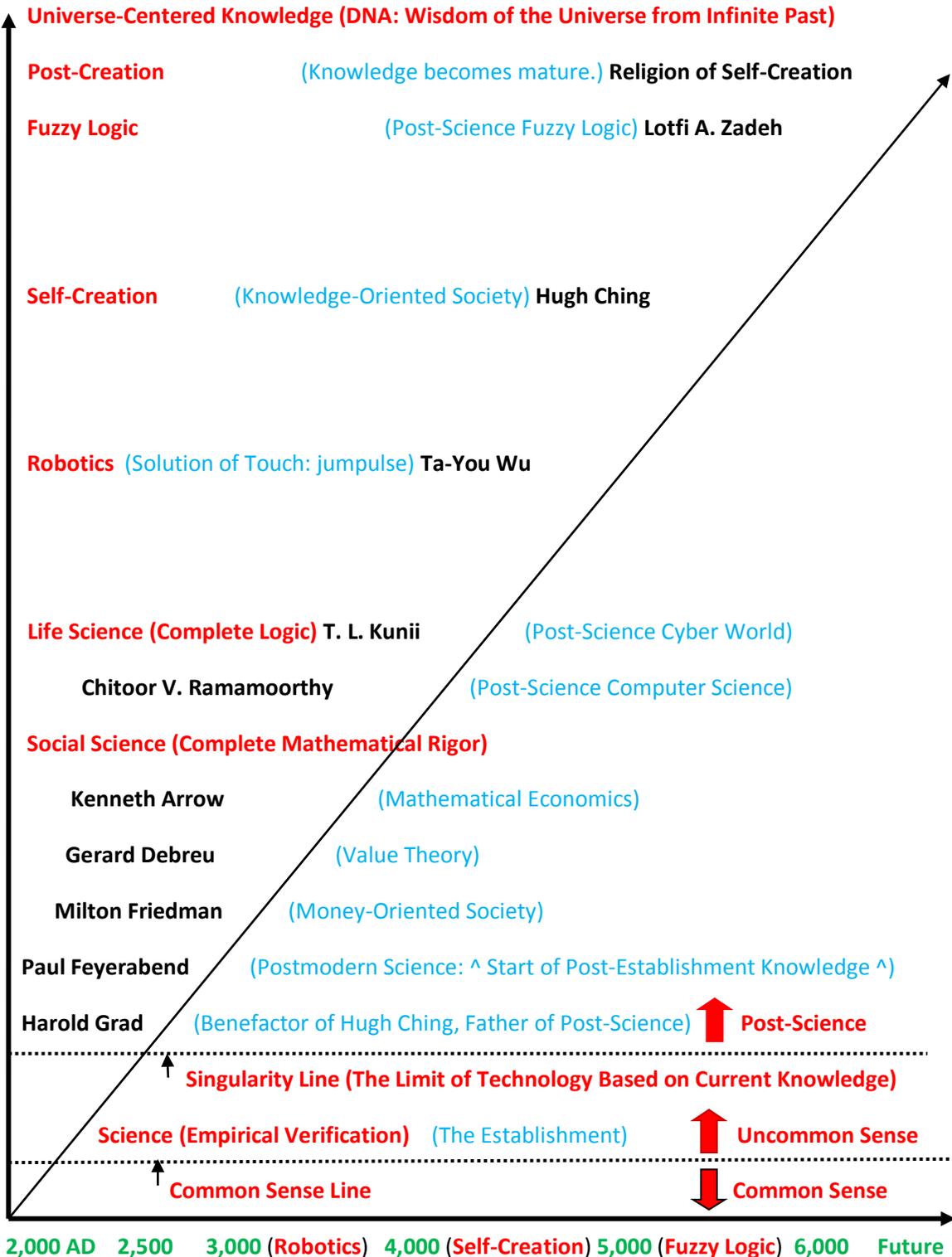


Figure 1 Culture Level Quotient (CLQ) of the Present and the Future Cultures

# Culture Level Quotient (CLQ) of Past Cultures

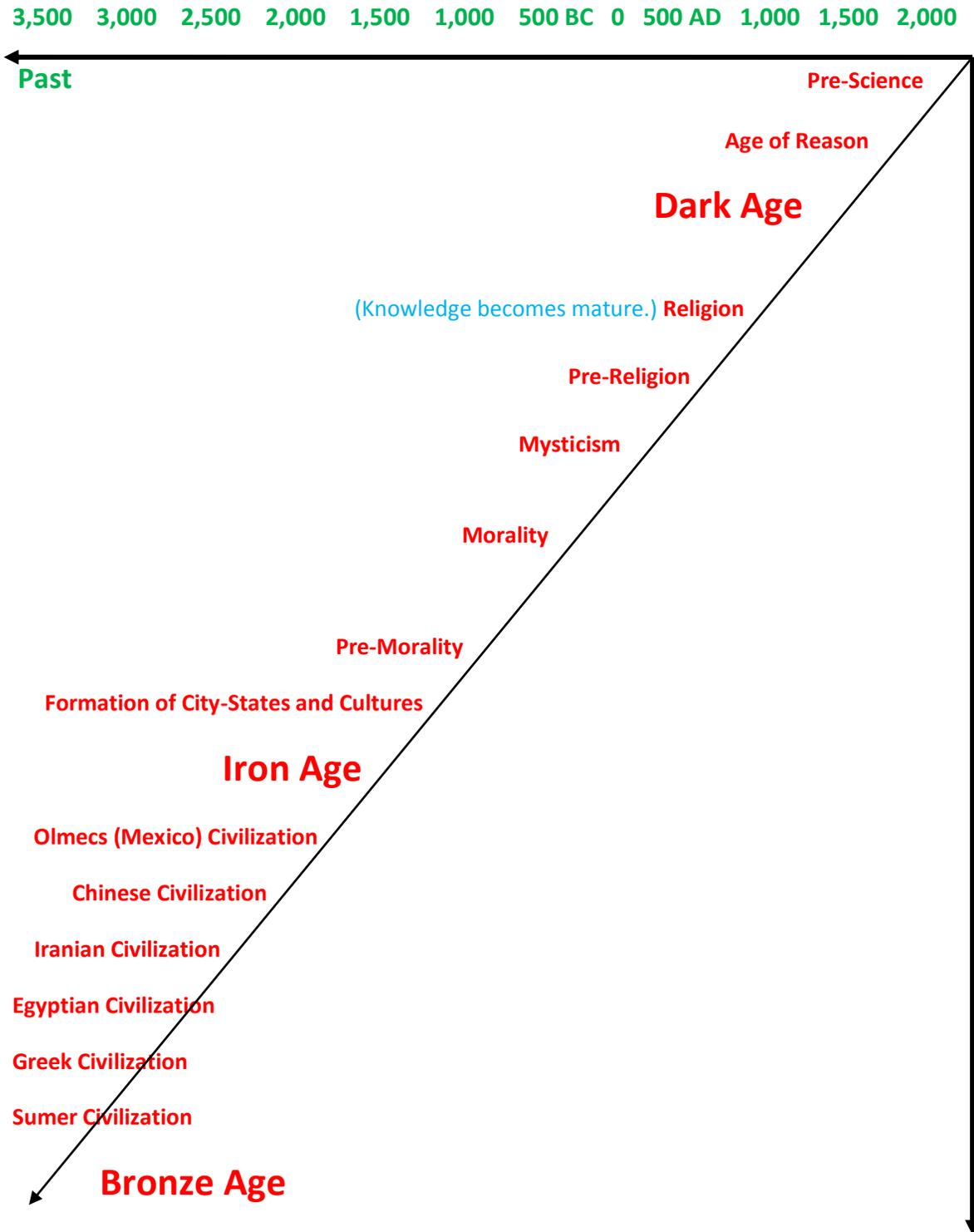


Figure 2 Culture Level Quotient (CLQ) of the Past Cultures

Mankind owes a debt of gratitude to Lotfi Zadeh and his dedicated team of researchers for their pioneering research in the field of fuzzy logic. Their relentless pursuit has opened the eyes of the world to the vision of knowledge of the next 4,000 years.

## Commercial Applications

Artificial Intelligence (AI) should start with the Self-generated Neural Network of software cell [2] based on UPS [1] and fuzzy logic, but is not. AI is leading the society into a complexity crisis due to the need of manual updating of AI software. UPS is provided by Post-Science Fuzzy Logic Team to society free of charge. The Infinite Spreadsheet (IS) [3] had dominated locally commercial real estate prior to passing of the law FIRREA of 1989, which is a de facto endorsement of the market comparison appraisal method. Fuzzy Infinite Spreadsheet, where a range of values replaces one single value in each cell, should completely dominate the real estate business and stock analyses in the future. Universal Permanent Number (UPN) [4] based on UPS will dominate big data by assigning globally distinct integer names to all the permanent entities, such as DNA, land parcel, books, and personal identification numbers.

## Biography

**Hugh Ching.** (post.science@yahoo.com) received his B.S., M.S., and Sc.D. degrees from the Massachusetts Institute of Technology, Cambridge. He is the founder of the Knowledge-Oriented Society and the father of post-science. His mentors include some of the greatest thinkers of our time. Harold Grad, an intellectual descendant of David Hilbert, mentored him in mathematics, and Paul Feyerabend mentored him in philosophy relating to postmodern science. Additionally, Milton Friedman mentored him in economics relating to deregulating man-made laws. Chitoor V. Ramamoorthy mentored him in software engineering. Upon the advice of his close collaborator Tosiyasu L. Kunii, the founder of the Department of Information Science at the University of Tokyo, Ta-You Wu, the father of Chinese physics, collaborated with him on physics, particularly on the solution of robot touch based on their newly discovered physics concept of jumpulse, a sudden change of force, as Newton's impulse is a sudden change of momentum. He solved the problem of value posed by his friends Kenneth Arrow and Gerard Debreu. Lotfi A. Zadeh, the father of fuzzy logic, guided him to realize that "fuzzy is more accurate than exact."

## Reference:

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