The Origin, Essence, and Attributes of Consciousness

Freelance writer：Cheng GONG

Mail address：gongfafa@126.com

Abstract： It has a long history for the exploration of the origin and essence of human consciousness with different definitions and explanations in various fields such as philosophy, medicine, sociology, biology, and psychology etc. However, all of them had not been recognized so far. The main reason is that the complexity of consciousness leads to the inability of various fields to understand its essence fully, reasonably, and comprehensively, and there are still significant differences for it, and which have become an eternal mystery. So, it is necessary to delve deeper into it.

Based on the knowledge analysis, summary and induction of various disciplines, this paper draws the following conclusions: the origin of consciousness comes from natural material; The essence of consciousness is material information; The capacity of consciousness is the utilization degree of the complexity and orderliness of material information; Consciousness has the attributes of congenital, materiality, complexity, systematicness, dynamism, difference, and selfness.

Keywords: Material information, Complexity, Orderliness, Energy, Brain Active State (BAS), Attributes.

1 INTRODUCTION

The concept of consciousness comes from the Latin word Consciencia (English: consciousness), which means cognition and generally refers to advanced neural activity. The

consciousness is now adopted by many disciplines, but each discipline has different understandings and interpretations for it, such as philosophy, biology, medicine, and psychology and so on.

Here are some excerpts from the definitions of a few different areas.

- Definition of Idealism

The ancient Greek philosopher Plato believed that consciousness originates from the soul, such as reason, will, and emotions. The phenomenon of consciousness is an attribute of the soul. The soul is the initial thing that existed before the form and can dominate the movement of the form. It lived in the world of ideas before the formation of human beings.

- Definition of Materialism

The reflection of the human brain on the objective material world is also the sum of various mental processes such as feeling and thinking.

- Definition of Psychological

The understanding of consciousness in the field of psychology can be broadly and narrowly defined.

The broad concept of consciousness refers to the brain's reflection of the objective world. Its definition is the same as the content of Materialism.

The narrow concept of consciousness refers to the degree to which people perceive and pay attention to the outside world and themselves.

- Definition of Biological

Human consciousness arises in the brain, which consists of the cerebrum, cerebellum, thalamus, hypothalamus and basal nucleus. It can analyze various sensory information such as vision, hearing, touch, smell, and taste through the cerebral neurons transmitted step by step as

samples, which are synthesized by the thalamus into thalamus and released to the contact area of the brain, causing the brain to produce awareness, i.e., the consciousness of human beings.

To interpret it as rationally, fully, and comprehensively as possible, this paper analyzes, summarizes, and generalizes the knowledge of various disciplines and draws conclusions about the origin, essence, and attributes of consciousness, as follows.

2 THE ORIGIN OF CONSCIOUSNESS

The origin of consciousness began with the birth of the universe, then produced inorganic matter and organic matter, and finally evolved into living organisms, until the birth of human consciousness.

2.1 Production of Inorganic Material

According to the evidence of hydrogen abundance, cosmic background radiation and interstellar redshift in astrophysics, it is shown that the universe was formed 13.8 billion years ago by a singularity (0 point) with a huge and immense amount of energy that went through a big bang to produce everything in the universe, such as all kinds of matter, all kinds of forces (energies), time and space, and so on. The first substances formed were monomers such as hydrogen and helium, and then various inorganic substances such as monomers and compounds, including galaxies, were formed through processes such as nuclear fusion, nuclear fission, the explosion of galaxies and neutron mergers.

Around 4.5 billion years ago, the solar system began to be born, and the main matter on Earth at this time was inorganic matter such as elemental matter and compounds, and these substances all had certain material information, that is, the information that matter existed. For example: various particle distribution, size, ordering, velocity, mass, energy, intensity, sound, and

electromagnetic fields and so on. The information in this type of substance determines its distribution and ordering characteristics under the action of energy, which determines the type, nature, and properties of the substance.

For example:

- Hydrogen nucleus (Hn): consists of 1 neutron (n) and proton (p), bonded by strong force to form 1 hydrogen nucleus (Hn), that is, 1Hn = 1n + 1p.
- Hydrogen atom (H): consists of 1 hydrogen nucleus (Hn) and 1 electron (e), bonded by electromagnetic force to form 1 hydrogen atom (H), that is, 1H = 1Hn + 1e.
- Hydrogen molecule (H_2): consists of 1 hydrogen atom (H) and another hydrogen atom (H), composed of H_2 molecule by covalent bonding, i.e., $1H_2 = 1H+1H$.
- Sodium chloride molecule (NaCl): It is composed of one sodium ion (Na^+) and one chloride ion Cl^-, which combine through ionic bonds to form a NaCl molecule, i.e., $1NaCl=1Na^++1Cl^-$.
- Sodium chloride molecule (NaCl): consists of 1 sodium ion (Na+) and 1 chloride ion Cl-, bonded by ionic force to form a NaCl molecule, that is, 1NaCl = 1Na+ + 1Cl-.
- Solar System: Consists of 8 planets, which in order from inside out are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune. Among them, the mass of the Sun accounts for 99.86% of the mass of the entire galaxy, and its gravity controls the orbit of the eight planets. i.e. 1 solar system=1 sun+8 planets.
- And so on.

In the microscopic world, the material information in various substances, such as quantity, charge, distribution, mass, sequencing and force (energy), determines the types of these substances, such as hydrogen nucleus Hn, hydrogen atom H, hydrogen molecule H_2 and sodium

chloride molecule NaCl, etc., that is, different material information determines different types of substances and their properties.

In the macroscopic world, the same is true, for example, the solar system is composed of 8 planets, space and 1 sun and other material information.

In addition, the material information in these substances needs to be under the action of force (energy) to exist. Although material information is not a substance and does not occupy space, it needs matter as a carrier to transmit and energy to support. For example, the hydrogen atom (H) is produced by the electromagnetic force between the hydrogen nucleus (Nn) and the electron (e); The hydrogen molecule (H_2) is produced by the covalent bond between two hydrogen atoms (H). Sodium chloride (NaCl) compounds are produced by ionic bonds between sodium cation (Na+) and chloride anion Cl-; The solar system is created by gravitational pull of 8 planets, and so on.

Because the essence of force (electromagnetic force, covalent bonding, ionic bonding, and gravity etc.) is energy, different forces (energy) determine the distribution and order of material information in these substances, and energy is the root of determining the material information and their order.

The ancient Greek mathematician and philosopher Pythagoras (c. 580 BC - c. 500 BC) said: "Everything is number", in which "number" is material information, which can be understood as "everything is material information".

Although material information is not material and does not occupy space, it requires material as a carrier to store and transmit under energy to support.

In short, material information is the state of distribution and ordering of matter, which does not occupy space, does not have energy and mass, but needs energy support, and energy

determines the distribution and ordering of material information in various substances, as well as its types and properties. So the type and essence of a substance is determined by the material information within it.

It is an evolution process of material information from nothing to simple for its quantity and from nothing to low for its degree of order at this stage.

It is realized for the process from 0 (energy) to 1 (inorganic matter).

2.2 Production of Organic Material

About 3.8 billion years ago, inorganic material on Earth formed more complex organic compounds (such as phosphoric acid, ribose, deoxyribose, and bases) through physical and chemical processes under the influence of environmental factors such as sunlight, lightning, water, and oxygen. Then, ribonucleotides and deoxyribonucleotides were synthesized, and the natural world evolved the genetic material deoxyribonucleic acid (DNA) and ribonucleic acid (RNA). RNA is an organic molecule that can self-replicate, gradually combines with other substances to form more complex substances, ultimately forming single-celled organisms. This process is considered crucial for the transition of life systems.

With hereditary material, it can be passed on from generation to generation, endlessly, giving rise to the rudiments of lower life, and becoming a milestone in the evolution of the biological world. The key among them is the genetic information in the genetic material, i.e., the material information. For example, different structural RNAs: messenger RNA (mRMA), ribosomal RNA (rRNA), transport RNA (tRNA), small nuclear RNA (snRNA), microRNA (miRNA), long non-coding RNA (lncRNA), small interfering RNA (siRNA), siRNA and circular

RNA (circRNA) determine the different roles and functions of RNA. That is, the different material information in RNA determines the different structures, types and functions of RNA.

It is an evolution process of material information from simple to complex for its quantity and from low to high for its degree of order at this stage。

It is realized for the process from 1 (inorganic matter) to 2 (organic matter).

2.3 Birth of Life

About 3.5 billion years ago, due to the production of new substances such as proteins, sugars, fibers, phospholipids, and enzymes, as well as trace elements such as Na and K that already exist on Earth, the stable cells were gradually synthesized through continuous arrangement and combination under certain conditions (such as volcanic eruptions), and then forming single celled life forms. At this point, although they respond to external changes, single celled organisms cannot yet be recognized as conscious with only forming some instincts in the process of evolution to adapt to the needs of the environment.

For example, paramecium is a single-celled organism that does not have neurons or a nervous system, but it can sense environmental changes and reactions through its own functions, such as chemical and physical reactions. Such as: cilia oscillation and chemical reactions. These reactions are carried out through a signaling system within paramecium, including a series of proteins and ion channels that transmit information within the cell and regulate the cell's function of seeking advantage and avoiding harm. Although the current scientific theories are not enough to fully explain its principle, the content involved in this process includes electrical signals, conduction, molecules, ions, and physical and chemical reactions. Mechanical energy, electrical energy, chemical energy, etc. and complete these reactions, including the processes of generation,

transmission, reception, and processing of this information the function of a single cell to seek advantages and avoid disadvantages is generated by the support of energy in the material information and its body.

Subsequently, some jellyfish organisms have begun to exhibit peptidergic cells that are very close to neurons possessing functions such as sensing, transmission, processing, and response etc. With the continuous evolution of organisms, the nervous system gradually emerged from polyhedral cells, flatworms, fish, and animals such as monkeys and apes.

The evolutionary process of the nervous system is from dispersion to concentration, becoming a transit station for transmitting information, where nerve cells are concentrated into ganglia, and nerve fibers are clustered into bundles. Several ganglia in the front part of the animal's body fused together to form a "brain", which gradually evolved into fish, etc., and finally to primates.

Among them, neurons are the foundation of brain operation, and their structure is composed of cell bodies, for example: dendrites, axons, synapses, and nerve endings etc. The component information themselves are material information, and each unit is composed of some basic material, and its structure is also composed of the basic material information.

Among them, neurons are the basis of brain operation, and their structure is composed of cell bodies, dendrites, axons, synapses, nerve terminals and other units. The component information of these units is a kind of material information, and their structure is also composed of material information.

Different neuronal connections and interactions produce different functional blocks, such as visual function, memory function, and computational function, and the connection and action of these functional blocks produce the animal's consciousness system.

It is an evolution process of material information from complex to more complex for its quantity and from high to higher for its degree of order at this stage.

It is realized for the process from 2 (organic material) to 3 (living organisms).

2.4 Birth of Humans

About 3 million years ago, primates began to leave the primeval forests and enter the plains for various reasons (changes in geographical conditions). In order to survive, they continue to participate in some unique social activities, such as hunting, labor, cooperation, life, communication and learning, etc., these advanced and complex activities constantly stimulate and update the material information in the brain, plus the food from raw omnivorous to cooked meat, accelerate digestion and nutrient absorption, in the "natural selection, survival of the fittest" principle and genetic mutation to promote the expansion of the brain basal capacity, brain capacity almost increased by more than 2 times, This leads to an increase in the complexity of the brain's basic structure (material information); In addition, under the stimulation of various social activities unique to human beings, the order of material information in various functional areas of the brain has been greatly improved, resulting in the upgrading of their brain functions, such as the birth of language, and finally the formation of the consciousness system of modern people.

The essence of this evolutionary process is also due to the increase in the complexity and orderliness of material information in the brain, that is the change of material information. This information includes: the number of neurons, structure, electromagnetic field, voltage, current, signal, distribution, sequencing, and transmission in the brain, as well as the various morphologies composed of physical and chemical reactions, including their static and dynamic.

The ancient Chinese philosopher Laozi once said, "Nothing（0） generates being, being generates TAO, TAO generates 1, 1 generates 2, 2 generates 3, 3 generates all things." This "nothing（0）" represents energy, "Tao" represents principles, and "all things" represent various living organisms. Obviously, this process is a process of continuous complexity and orderliness of material information.

It is an evolution process of material information from more complex to the most complex for its quantity and from higher to the highest for its degree of order in human brain at this stage.

It is realized for the process from 3 (living organisms) to all things (humans).

3 DEFINITION OF CONSCIOUSNESS

According to the previous introduction of the evolution process of living consciousness, consciousness is the process of complexity and orderliness of material information formed under the support of energy, including the formation of various functions in the consciousness system, and the completion of the entire life journey from 0 (energy) to all things (humans). For this purpose, the following definition of "consciousness" can be derived:

Consciousness is a network active state formed by the material information under the support of energy in human brain. Abbreviated as Brain Active State (BAS).

Operating principle: It involves inputting information from both internal and external sources into BAS for processing (such as induction, encoding, storage, calculation, extraction, transmission, and perception etc.), and then outputting the processed information to various organs to directing their activities with the support of energy in the human body.

Further explanation as follows:

3.1 Material Information

Material information is the state formed by the sorting, distribution, and combination of various material. This state consists of various forms including static and dynamic, for example: such as the distribution of material, quantity, sorting, electromagnetic field, voltage, current, signal, and physical and chemical reactions and so on.

Material Information Example - Desert Rescue

Someone got lost in the desert and called the police to solve the problem. The police immediately dispatched a helicopter to search. Due to the vast and sparsely populated desert, it was not easy for rescuers to find him, so he piled up three prominent SOS English letters on the surface of the desert with rocks. Under his conscious command, the disordered rocks were transported by his hands and feet (with energy support) to form an ordered sequence of three English letters SOS (Material Information). The information was quickly discovered by the rescue pilot during patrol, and rescue measures were immediately implemented to transfer the rescued person to a safe place. The number, size, and material of the stones have not changed, only their position or status has changed, that is, they are arranged into the letters SOS as information, which is the distribution status of the stones (materials) from disorder to order, forming a certain degree of order, ultimately leading to the successful completion of the search and rescue mission by the police. This is an example of a process where material information, supported by energy and directed by consciousness, is processed from disorder to order, and then to being rescued.

The existence of material information is dependent on matter, in which matter must occupy space, while information does not occupy space. In addition, information itself does not have

energy, but its propagation requires energy. Material information is just the state of matter corresponding to time and space. Although material information itself does not have energy, it is intentionally created into order by human consciousness, such as the example of "seeking help in the desert" mentioned earlier, which forms a certain degree of order and is utilized and reused with the support of energy to command various human behaviors. At this point, it can be understood that material information has energy, because it is with material information that there is a possibility of saving life.

The material information itself does not have energy in the human brain, but it has a certain degree of complexity and orderliness of the material information formed due to innate and acquired development in BAS, which is the result of directing various human behaviors under the support of energy. The impact of these behaviors can be understood that the material information has energy, because the degree of these behaviors depends on the complexity and orderliness of material information in BAS. in which "**orderliness** " can be understood as the entropy value, and its meaning of **"orderliness"** mentioned in this article is ***the degree of logicality, rationality, and effectiveness of material information operation in BAS.***

The operation of this material information is mainly done by neurons and their network systems. For example, the dendrites of a neuron receive electrochemical stimulation pulses from other neuronal cells, and when these pulses are superimposed, once the intensity reaches a critical value, the neuron will generate an action potential and send electrical signals along the axis. The axon is composed of Lang Fei junctions, and the electrical signals sent by neurons can jump from one Lang Fei junction to the next, and with each jump, the voltage gating channel on the Lang Fei junction will open once, and the positively charged sodium ions inside and outside the cell membrane will be exchanged through the sodium potassium pump, and the membrane potential

will change, so as to complete the next jump. In this way, the electrical signal can be continuously transmitted without attenuating with distance. The axon then transmits the stimulus to the synapse at the end of the neuron, and the electrical signal triggers a voltage-sensitive protein on the synapse, pushing a vesicle containing a neurotransmitter (synaptosome) onto the membrane of the synapse, thereby releasing the neurotransmitter in the synaptosome. When these chemicals spread to the dendrites or axons of other neurons, they activate the sodium and potassium channels on the new neurons, so that the signals are transmitted to the secondary neurons, and so on. The interrelationship and interaction of these material information form some functions of the brain activate state (BAS), such as memory function.

In fact, the degree of human development depends entirely on the degree of material information utilization, that is that the higher the complexity and orderliness of information utilization, the higher the degree of human social development.

3.2 Energy

Mainly referring to heat, etc. During aerobic respiration, oxygen is inhaled from the lungs and enters the bloodstream through capillaries. It combines with hemoglobin in red blood cells to form oxygenated hemoglobin, which transports oxygen to the necessary tissues and organs. Oxygen is then separated from hemoglobin and sent to various parts of the body through physical reactions (diffusion), producing energy adenosine triphosphate (ATP).

Without the input of energy and oxygen, the BAS composed of neurons will lose its vitality and enter the state of brain death. Therefore, people need to eat and breathe to provide energy for the brain because all sports need energy. Without energy, there will be no movement, no movement momentum and activity, and no consciousness. Even the brain needs energy when it is

empty (a newborn baby) and dormant (sleeping or sitting), just to maintain the minimum energy because they still have certain activity.

3.3 Active State

Active state: it is a state of activity generated after energy excites substances (including electromagnetic fields). It contains three characteristics: exciting, activity, and state.

Active state example - blowing top ball test

Place a ping pong ball on the upper end of a hollow rod that is 60 centimeters long, 3 centimeters in outer diameter and 1 centimeter in inner diameter, and it will remain in a dormant state regardless of how time changes. The ball will float above the upper port and perform a fixed rotational motion with an active state if a certain amount of air is blown (energy excitation) at the lower port. With the passage of time, the state continuously rotates in a regular pattern and is now in a stable state. If the intensity of the injected gas changes over time, the motion state of the ball will also drift up and down, and the number of states will vary at different times, indicating that it is in motion. The state of this ball is the material information formed under the support of energy, and it forms different states from space and time.

From a spatial perspective, BAS can be divided into three types: unit active states, functional active states, and system active states.

It can be divided into infant state, juvenile state, adult state if differentiated by age; it can be divided into dormant state, stable state, and dynamic state if differentiated by day.

3.4 Input Information

The BAS can process (e.g., encode, store, and retrieve) input information and output it.

Input information comes from external and internal perception organs. There are many classification methods for it, which can generally be divided into three categories based on the location of the sensory organs and the source of the stimuli received: first, external receptors: distributed in the skin, mucous membranes, visual and auditory organs, receiving stimuli from the external environment, such as touch, pressure, cutting, temperature, light, and sound, etc. The second is the internal receptors: distributed in viscera, blood vessels and brain etc., receiving stimuli applied to these organs, such as pressure, osmotic pressure, temperature, ion and compound concentrations and active spillover information stored in the brain, etc. The internal sensors also contain mutual input between various functional regions in BAS, such as memories after information extraction in brain memory blocks; The third is proprioceptive receptors: distributed in muscles, tendons, joints, and inner ear position receptors, receiving stimuli generated during body movement and balance.

Such as color vision. The light reflected enters the human eye by an external object. The light passes through the cornea and enters the pupil and is focused on the retina after being bent (refracted) through the cornea and lens. More than 1 million photoreceptor cells on the retina convert light into electrical pulses, which are transmitted to BAS along the optic nerve. After processing (such as compilation and transmission), it forms image perception to generate vision, and stores the information. It refers to input information for the optical and electrical signals and so on.

3.5 Output Information

BAS is the center that processes (such as encoding, computing, storing, and extracting etc.) input information, and outputs into other human organs to promote their activity with the support

of energy and transmission by the nervous system. For example: perception and reactions, perception including various sensations such as pain, soreness, and pleasure etc. Reactions including various human activities such as language, behavior, and sleepwalking etc.

3.6 Various Functions

Various functions: the function active state has the function of outputting information after processing the input information (encoding, storage, memory, search, motion, space, vision, balance, analysis, calculation, coordination, and transmission, etc.). They are in different regions of the brain. According to the results of medical research, the frontal lobe of the brain is mainly responsible for motor, attention and executive functions; The parietal lobe of the brain is mainly responsible for spatial function; The temporal lobe of the brain is mainly responsible for memory and emotion; Occipital lobe is mainly responsible for visual function; Cerebellum is mainly responsible for human balance function; Brain stem is an important pathway for the interaction between the brain and spinal cord. There will be different discussions in various fields (medicine, biology, psychology, etc.), but it will not affect the argument of this paper.

The functional activation state is composed of the most basic unit activation states, which are not interfered with each other but are interconnected and act on each other, forming a powerful, incredible, and very complex BAS.

3.7 Network

In BAS, it is linked for material information (including electromagnetic fields) and energy in the brain with the nervous system. The transmission speed of nerve fibers is 250 kilometers per hour, and the fastest speed is about 100 meters per second. The fastest reaction time for people to

the outside world is 0.001 seconds. But the reaction time of people is about 0.1 seconds from receiving information (various organs) to processing (various substances in neurons) and then sending out information. Of course, different conditions such as congenital inheritance and acquired practice will lead to different reaction degrees, and it is also possible to differ by an order of magnitude. All these transmissions are completed by neurons, and a group of neurons form a functional block (such as storage function and visual function and so on), and then it forms the network system to be BAS with the connections between the functional blocks.

4 ATTRIBUTES OF CONSCIOUSNESS

According to the definition and essence of BAS, we can draw the conclusion that consciousness has congenital, materiality, complexity, systematicness, dynamics, difference, and selfness.

4.1 Congenital

Genes (Genetic factors) are all the nucleotide sequences required to produce RNA (Ribonucleic Acid) and support the basic structure and performance of life, and store all the information of race, blood type, pregnancy, growth, and apoptosis of life. All life phenomena such as the birth, growth, decline, disease, aging, and death of organisms are related to genes, which are also the internal factors that determine the health of life. Therefore, genes have dual attributes: materiality and informativeness. The former is the carrier of gene existence, and the latter is the state of gene existence. Both constitute the material information of genes.

This genetic information is transmitted from one individual to another through various physical and chemical actions in the form of replication, so it faithfully retains the information

characteristics of the previous generation. Genetic genes are the main material basis for storing and transmitting genetic information and replicating cells. Of course, brain cells are no exception, and there must be material information in genetic genes, which also leads to the reason why everyone's natural intelligence is different. These genes are related to the complexity and order of material information.

From this point of view, people do have destiny, such as someone who is naturally smart and eager to learn and someone who has a talent for music etc. That is, congenital factors can determine a certain complexity and order of BAS, which will affect the acquired behavior and results, which can be understood as fate. As the saying goes, "you get what you sow."

In short, the birth and development of human beings are born and powerful because of information.

So, BAS has the attributes of congenital.

4.2 Materiality

The material information is the order, distribution, and combination of various substances in BAS. It is composed of electromagnetic fields, electrons, currents, signals, ions, atoms, molecules, neurons, and biochemical reactions etc. These information carriers are neurons and glial cells. Nerve signals are electrically transmitted in neurons by means of action potentials, while among neurons, they are transmitted between synapses by means of chemical transmitters. They are interconnected through synapses and basic signal processing unit of the human brain. Their main function is to receive information and transmit it to other cells. The electric pulse signal passes through the axon to the axon terminal, causes the vesicles in it to change and release neurotransmitters, and then adds to the dendrite of another neuron through the synaptic gap. The

receptors on dendrites can accept neurotransmitters to change the permeability of membrane to ions, so that the concentration of ions outside the membrane changes, and the potential changes and conducts. Obviously, the activities of these neurons are related to material information.

Since neurons are the basic units of BAS, it is obvious that the materiality of BAS can also be determined.

So, BAS has the attribute of materiality.

4.3 Complexity

The brain is comprised of approximately 140 billion cells, weighing around 1400 grams. The cerebral cortex is about 2-3 millimeters thick, forming trillions of neural connections. There are over 100 billion neurons, with each neuron having between 1000-10000 synaptic connections extending to neighboring neurons.

These synapses act like circuits and have a "gate" that can pass through or stop the "electronic flow", and gradually form a powerful line network. These networks can store 10 trillion information, and their capacity can be equivalent to the storage capacity of 10000 computers. In addition, more than 100000 chemical reactions occur every second, including physical and biological reactions. The information itself is very massive.

The latest scientific research shows that the geometric architecture of the brain reaches over 10 dimensions, including vertical, horizontal, diagonal, and lateral dimensions. Moreover, neuronal thresholds are not limited to just 0 and 1, but can also be 0.5 and 1.5, or 2 and 3, among others. Therefore, scientists from different fields have not been able to fully understand its true operating principles to this day.

The main reason lies in the immense amount of material information carried by BAS and the highly intricate operational processes, encompassing both microscopic and macroscopic aspects, involving physics, chemistry, mathematics, biology, and potentially unknown disciplines. As of now, there is still no comprehensive, rational, and systematic understanding of its operational principles, making it a long-standing unresolved mystery.

So, BAS has the attribute of complexity.

4.4 Systematicness

There are many discussions on the principle and distribution of brain functional blocks in the biological and medical circles. Due to the complexity of BAS, each discussion has not been fully recognized, but it can generally be composed of seven important brain networks, namely sensory motor system, visual system, limbic system, central executive network, default mode network, salience network and dorsal attention network.

In short, no matter what kind of discussion, these functional blocks are excited by the smallest unit neurons, which form local connections and functions through the multi-dimensional transmission pathways of electrical signals, such as transverse, longitudinal, lateral, and oblique; Secondly, these functional blocks seem to be independent, but multiple functions will interact with each other, and then form system.

Neurons convert the input information into output information after processing, and then process the next input information before outputting information, gradually forming an interrelated and interrelated network function, and finally forming the network system BAS. All these features have typical systematic signs.

So, BAS has the attribute of systematicness.

4.5 Dynamics

From the definition of BAS, the consciousness is an active state, which is mainly reflected in the physical and biochemical reactions in the brain, as well as the continuous transmission of electrical signals and other activities. For example, there are about 100000 biochemical reactions per second, and these activities determine the activity of BAS. In addition, BAS will immediately become more active under its impetus if there is certain input information and sufficient energy is transmitted and continuously provided through the nervous system. The processing ability of BAS will be strengthened, and then through the transmission of the nervous system, it will command the reactions and activities of various organs of the human body, but the degree of movement is different in different states. These states are divided by age: infant state, juvenile state, adult state, and elderly state, and by day: dormant state, stable state and moving state.

In short, if there is activity, there is dynamic. The greater the activity, the stronger the dynamic. Otherwise, it is weak.

So, BAS has the attribute of dynamics.

4.6 Difference

The function of BAS is to process the input information and then output the information, and it has certain commonalities.

First, most of the material information carried by genetic genes is relatively consistent, leading to the consistent perception of some things and things. For example, vision, taste, hearing, taste, and power etc.

Secondly, it will also lead to a relatively consistent understanding of some things and things from the knowledge, experience and lessons acquired at the cost of thousands of years of social practice. For example, most people agree with universal values, such as kindness, sincerity, integrity, freedom, democracy, fairness, and justice.

But so far, there are still various contradictions, disputes and disputes among human beings living on the earth, which are mainly caused by the differences in BAS.

First, everyone's BAS is different. Due to the complexity of BAS, the amount of information is almost astronomical, and the structure of BAS (quantity and order of material information, etc.) that constitutes everyone is bound to be different, resulting in different processing methods and logics for the same thing and thing. For example, different BAS of different observers have different processing methods for the same thing, resulting in different output information, that is, different viewpoints.

Secondly, the observation angles of multiple individuals are different. When BAS acquires and processes information, everyone has different input information due to different perspectives, and the output information after processing will be different, such as different observers have different views on the same event from different perspectives.

Thirdly, the time is different. The same person will also have differences for viewpoints due to different ages. For example, when someone is young and old, they will have different views on the same thing, and so on.

In a word, the differences will cause the differences in BAS' output results after handling things in multiple dimensions of individuals, groups, time, and space (environment). These differences lead to the fact that BAS' output information may not truly reflect the objective facts,

it may be beyond the objective facts, it may also be a distorted reflection of the objective facts, it may also be its own subjective reflection, or it may even be a reflection out of nothing.

All these differences lead to the difference of everyone's world outlook, outlook on life and values, and are also the root cause of the formation of human contradictions.

So, BAS has the attribute of difference.

4.7 Selfness

In all kinds of existing systems in the universe, there will be a common feature is the existence of a "center", which has the characteristics of relatively large matter and high energy. For example, the atom exists with the nucleus as the center; The earth exists with the center of the earth as the center; The solar system exists with sun as the center etc. All these "centers" constitute the reason for the existence of the system. This is because all entities are running around the "center" in various systems. The "center" has great power (such as large mass or high energy) to control all the surrounding entities. Then for the "center", the concept of "I" is formed. The atomic nucleus will say that the atom is "mine"; Earth will say that the moon is "mine"; The sun will say that the earth is "mine"; Black holes will say that the Milky way is "mine" and so on. Obviously, the "center" plays an active, dominant, and important role, and obviously has the concept of "mine". But the electron will not say that the atom is "mine"; The moon will not say that the earth is "mine"; Jupiter will not say that the solar system is "mine"; The sun will not say that the Milky way is "mine" and so on. This is because non "central" entities do not have enough power to control other entities, so there is no "I" concept. They play passive, subordinate, and secondary roles, that is, passively controlled, in a subordinate position, playing a secondary role, there is no "I" concept.

In a biological and social system, there will also be a common feature. There also is a "center" which has great power to control the whole system. For example, cells exist with the nucleus as the center; The human body exist with the brain as the center; The family exists with parents as the center; Enterprises exist with the boss as the center and countries exist with the king as the center etc. All these "centers" constitute the "I" concept because all activities are carried out around the "center" in this system. So, the nucleus will say that the cell is "mine"; The brain will say that the human body is "mine"; Parents will say that family is "mine"; The boss will say that the enterprise is "mine"; The king will say that the country is "mine" and so on. Obviously, the "center" plays an active, dominant, and important role in the system.

But the cell membrane will not say that the cell is "mine"; Hands and feet will not say that the human body is "mine"; Children will not say that family is "mine"; Employees will not say that the company is "mine"; People will not say that the country is "mine" and so on. Obviously, this is because they do not have the power or energy to control other entities, and play a passive, subordinate, and secondary role.

Obviously, the "center" can be understood as the core part of a system. This part has the characteristics of high energy and large material, occupies a dominant position, has a strong desire for possession, and has the concept of "I", that is, "I am the center." "The center is me." "Everything is mine." and so on.

Of course, the human body system is no exception. As the central control area of the human body, BAS determines its dominance: "Everything is mine.", "I am right.", "I am good." and other self-concepts, resulting in the emergence of self-identity. Because everyone regards themselves as the "center", they will have different views on the same thing in social activities, resulting in differences and contradictions.

So, BAS has the attribute of selfness.

5 CONCLUSION

- ***The essence of consciousness (BAS): is material information.***
- ***Characteristics of consciousness (BAS): has three major characteristics: exciting with energy, keeping activity and forming information state.***
- ***The ability of consciousness (BAS): is the degree to which the complexity and orderliness of material information are utilized.***
- ***Attributes of consciousness (BAS): has seven attributes: congenital, materiality, systematicness, complexity, dynamics, difference, and selfness. Selfness and difference are the core issues of human contradiction.***

Acknowledgments：None

Declarations: Not applicable

References：Some basic knowledge comes from public networks, such as Baidu etc.

First release in English：https://philpapers.org/rec/GONTOE

First release in Chinese：https://zhuanlan.zhihu.com/p/690445607