Abstract

The major conflict in the old philosophy of mind was the material or supernatural origin of mind and consciousness. Based on ~~of~~ new neuroscientific findings, philosophers have become more cautious in considering the immaterial origin of mind the mind. At present, the main debate in the philosophy of mind is the dependence or independence of mind phenomena on information and signals received from the outside world. If we consider the brain as a living organ and ~~mind~~ the mind as a product of brain activity, the need of this organ for matter and energy obtained from nature has been neglected as signals. Gut hormones, food-derived nutrients, and gut microbiome effects influence ~~on~~ brain functions. Therefore, it is impossible to consider a separate brain from ~~surrounding~~ the surrounding world as long as it is alive and ~~need for~~ needs nutrient flow.

Key words: Mind, Internalism, Externalism, Nutrients, Microbiome

Philosophers have long discussed that does an embodied brain in vat maintain awareness? It has long been postulated that a person's experiences are characterized by ~~interaction~~ the intraction between the brain, the body, and the environment. However, recent findings showed that brain without sensory input may show some level of awareness in an offline mode. In 2020, Bayne and his colleagues explained situations in which the brain ~~have~~ has no or reduced communication with the outside world including hemispherectomy, ex cranio brain, and cerebral organoids. They suggested that the brain might be able to show the island of awareness under these situations by using indirect index of awareness, the perturbational complexity index (Bayne, Seth, & Massimini, 2020). Despite the similarity with the internalistic point of view, they proposed that the independent islands of awareness in a disconnected brain may be in line with just some levels of consciousness.

During 1980s, Hilary Putnam, mentioned Descartes' skeptical view about the reality of the world outside the mind, in his “brain in a vat” hypothetical experiment. He assumed a brain, separated from the body, in a container full of nutrients and factors necessary for its survival and function. The brain was connected to a computer via electrodes. All emotions, perceptions, memories, and thoughts were induced by the computer in the separated brain. Thus, there was no need for external signals through the body. Based on this assumption, our understanding of the reality of the world can be an illusion induced by a computer. This idea was represented in the Matrix series of movies by Wachowski brothers. As one of the externalism pioneers, Putnam, believed that we cannot be a “brain in vat” (Forbes, 1995) because we could not realize that "we are a brain in the vat", unless the inducing computer commanded.

At present, the main discrepancy in the philosophy of mind is less about its material/immaterial origins, but more about the intrinsic or both intrinsic and extrinsic origin of the mind. Internalists theorize that events that cause formation of the mind phenomena in the central nervous system (CNS) are located inside the person’s body. They consider mind to be constant and just dependent on internal characteristics of an individual. In contrast, externalists propose that factors, other than intrinsic parameters, interact with messages from the surrounding environment and ~~leads to~~ lead the formation of mind qualia. Putnam argued the effect of external reality on the meaning of terms in the mind by the twin earth argument in his article, “The Meaning of "Meaning” {Putnam,}. Avicenna, a famous Iranian philosopher in the 11th century, might be the first who discussed we have a special kind of consciousness that is different from being aware of our body. Thus, if we keep a person suspended in a dark space without receiving any signal from the surroundings, he is still able to be aware of his existence. Although~~,~~ ; similar to Descartes, Avicenna believed that the mind is located in an immaterial soul, and the floating man argument proposed that human does not need an external signal for consciousness {Alwishah,}.

All theories which confirm the independent role of brain in the formation of mind and consciousness ignore the requirements of living brain. They have assumed that brain communicates with the outside world just with sensory signals, which in Putnam's argument was replaced by a computer.

Although we think we know life, its definition has been disputed among philosophers from Aristotle to recent scientists. Biologists determine three main traits of life which are common among all living organisms to avoid philosophical conflicts about life definition: 1) Methods of obtaining energy to maintain their structure and functions; 2) making a new copy of themselves which is the most important mission of living beings; 3) The capacity to evolve for better compatibility with their environment. These characteristics ~~causes~~ cause ~~a~~ huge biodiversity on earth throughout the history of life {Nelson, 2017}.

Among the elements on earth, 25 of them, mainly carbon, hydrogen, oxygen, nitrogen, sulfur, and phosphorus are present in ~~the life-forming~~ biomolecules. Chemical reactions tend to move toward more entropy, but the life depends on reactions that lead to more complex and ordered molecules. Two types of chemical reactions are performed at cellular level. ~~Reactions that produce energy and those that consume energy.~~ ~~Energy-consuming~~ energy-consuming reactions are accomplished at the expense of ~~energy producing~~ energy producing ones to form compounds that are necessary for maintaining the structure, functions, and homeostatic mechanisms. Homeostasis is needed to stabilize the internal environment of living organisms. Plants trap and store sunlight energy in the chemical bonds of some biomolecules. Other organisms use these energetic compounds as a source of energy. After death, some microscopic organisms convert ~~the~~ biomolecules into simple organic compounds. These materials return to nature and are re-used by plants as a source of building material to make new ~~biocompounds~~ bio-compounds. Therefore, the main cellular reactions are dependent on energy-generating reactions, which in turn, are directly or indirectly dependent on the energy trapped by plants. Plants, likewise, need sunlight and matter provided by the earth to produce biomolecules for themselves and other living organisms {Nelson, 2017}.

The brain consists more than of one hundred billion neurons, ~~the~~ main function of each is to connect to hundreds and thousands of other neurons, through special junctions called synapses. This network provides a huge information platform. The findings of modern neurology show the importance of neural connections (i.e. connectome) in the formation of mental phenomena including consciousness, memory, intentions, and emotions. The number of these connections increases until the age of two, when sensory perceptions are fully generated. They then gradually decrease until adulthood, but simultaneously the quality of connections improves {Cao,}. The connectome is dynamic; every perceptual experience causes formation of new connections. Reactivation of these neural circuits ~~lead to~~ leads the recreation of those emotional or perceptual experiences as memory. However, if these connections are not used, they gradually disappear. Therefore, it is not an overstatement to say: “I am my connectome.” {Seung,}.

Neurotransmitters are chemical compounds ~~which play~~ that plays major roles in communication between neurons. Among them, three biogenic amine neurotransmitters, dopamine, norepinephrine, and serotonin are more important in the formation of cognition and emotions {Kruk,}. Norepinephrine (NE), as the main postganglionic sympathetic neurotransmitter, has a known effect on attention, emotion, ~~decision making~~ decision-making , and creating and regulating awareness. Norepinephrine is high in awake individuals and declines during sleep {Baloyannis}. It has been shown that norepinephrine also links visual awareness to surrounding world events (Sagiv). ~~Dopamine producing~~ Dopamine-producing neurons -dopaminergic neurons- also decreases in patients with impaired consciousness and those under anesthesia in some brain parts. Increased production of dopamine is associated with diseases such as schizophrenia and related hallucinations (Brisch et al., 2014). Serotonin is one of the most important neurotransmitters and is involved in the regulation of emotions, moral judgments, memories, mood, appetite, and sleep. Serotonin-enhancing drugs such as citalopram increase moral emotions and inhibit harmful behaviors in healthy individuals {Crockett,}. Some hallucinogenic drugs such as LSD and Mescaline cause disturbances in understanding reality through the overactivation of serotonin receptors in the brain {Rolland,}. In 1993, Peter D. Kramer in his book, "Listening to Prozac" revealed the philosophical aspects of administrating the antidepressant fluoxetine or Prozac, which causes dramatic alterations in people's personality and cognition. Even some patients treated with fluoxetine stated that they no longer recognized their new selves {Kramer,}.

Mystical, philosophical, and ~~morality~~ moral thinking are not the main function of the brain. From an evolutionary point of view, the main function of the CNS, particularly the hypothalamus, is hemostatic regulation of energy metabolism to survive and reproduce in harsh environment (Barrett). CNS receives signals from the metabolic tissues to perform homeostatic regulation of metabolism. These inputs are hormones of gut and fat tissues and diet-derived circulating nutrients which cross blood-brain barrier (BBB). The brain-derived outputs including autonomic efferent nerves, in turn, regulate digestion, gut motility, absorption, and metabolism in the main metabolic organs (Roh). Interestingly, peripheral metabolic signals such as metabolites and hormones received by CNS also can influence emotions, behavior, decision making, motivation, and higher cognitive functions. Evidence shows that metabolic diseases including obesity and diabetes cause mental dysfunction. An obesogenic diet in mice can cause defective production of a ~~cholesterol derived~~ cholesterol-derived molecule in specific hypothalamic neurons, which ultimately decline memory (Ramírez). Fat ~~tissue derived~~ tissue- derived hormone, leptin, alters motivation, learning, memory, cognitive function, neuroprotection, and reproduction by affecting different brain areas (Morrison). Another adipose tissue hormone, adiponectin ~~which~~ decreases in obese individual and may lead to mental disorders including dementia and Alzheimer’s disease (Forny). Obesity shows a reciprocal association with psychological conditions such as depression through an alternation of the hypothalamic–pituitary–adrenal axis (Silvia)

These diet-derived signals also alter brain function. Anthelme Brillat-Savarin (1826) in his book “Physiology of Taste” has a famous quote: “Tell me what you eat and I will tell you what you are.”(Brillat-Savarin, 2012). Like other tissues, the CNS not only obtains energy and nutrients from diet but also utilizes amino acids as the precursors of the neurotransmitters. Dietary proteins and their amino acid contents play an important role in maintaining people's cognitive abilities, and low protein intake may have a negative effect on the occurrence of dementia in elder people (Glenn, Madero, & Bott, 2019). The low tryptophan diet causes a decline in serotonin synthesis in the brain, which may influence mood and emotions (Hughes et al., 2003). Dietary omega-3 fatty acids alter expression genes involved in maintaining synaptic function and plasticity in animals. Synaptic plasticity is alterations in synapses between neurons and allows them to adapt ~~with~~ to new information (Aiguo). Diets with high saturated fats and refined carbohydrate decline brain-derived neurotrophic factors and subsequently synaptic plasticity in the hippocampus ([R Molteni](https://pubmed.ncbi.nlm.nih.gov/?sort=date&term=Molteni+R&cauthor_id=12088740))

There is considerable evidence for the link between ~~mind~~ mental disorders and imbalance in intestine bacteria or symbiosis. Experimental studies showed that ~~germ free~~ germ-free animals have altered neurotransmitter synthesis and degradation, which subsequently affect stress reactivity and anxiety-like behavior (Carabotti). Tryptophan as a precursor of serotonin is consumed by some types of intestinal bacteria. Reduction of this microbial population leads to an increase in the amount of serum tryptophan or serotonin production, which finally increased mood and ~~decreased~~ decreases anxiety, in animal models (Neufeld, Kang, Bienenstock, & Foster, 2011). In the feces of patients with severe depression, either an increase in harmful microbes or a decrease in beneficial intestinal bacteria have been found (Jiang et al., 2015). ~~It is obvious that~~ humans and ~~the~~ microbes are inextricably intertwined as if we have never been alone. It even seems that the alteration in dietary pattern in the modern era ~~has an effect on affetcs~~ our way of thinking and feeling~~s~~. Fast foods with harmful fat alter the ability to learn, think and memorize and provoke depression, anxiety, and dangerous behavior in adolescents (Lowe, Morton, & Reichelt, 2020).

Several decades ago, the main question in mind philosophy was material or immaterial origin of mind. During the 17th century, Descartes skeptically stated that the existence of everything can be doubtful, except for thought and mind. His famous quote was “Cogito ergo sum" (I think; therefore, I am). He holds that the origin of mind, and soul, is immaterial and supernatural. His theory was named “Dualism” which represents the separation of body and mind. Despite doubting the reality of the body, he suggested pineal gland as the site for connection of soul to brain. This suggestion was probably because he assumed that most parts of the brain are in pairs, and pineal gland is just one. However, Descartes's argument has a serious bug: how does an immaterial thing, mind, influence body as a physical material? Modern neuroscience proposes that mind qualia including fear, pain, emotions and perceptual states are physical qualities which are emanated from brain activity and influence the body. There is convincing clinical evidence that damage to distinct parts of the brain can affect mental faculties. Although this physicalist view is not error-free, it is now more dominant among scholars (Tryon, 2014).

Taken together, biomedical data ~~clearly~~ prove that existence of a real disconnected brain without any relationship with other parts of body and environment is impossible. Blood supplies compounds ~~which~~ that cross BBB to CNS. Brain reciprocally regulates nutrient flow in the body. Brain has evolved to maintain energy resources and nutrients flow in the body. Dietary compounds and metabolites of microbiome are vital signals which exert their effects on higher part of brain to regulate decisions, desire, happiness, mood, and so on. Therefore, does a disconnected-brain is really offline and separated from the outside world? According to causality rule, spontaneous formation of mind in brain should have an explanation. If external signals are not considered, the only remaining description may be to return to Descartes' dualism.

**Edited Version:**

Philosophers have long discussed that does an embodied brain in vat maintain awareness? It has long been postulated that a person's experiences are characterized by the interaction between the brain, the body, and the environment. However, recent findings showed that the brain without sensory input may show some level of awareness in an offline mode. In 2020, Bayne and his colleagues explained situations in which the brain has no or reduced communication with the outside world including hemispherectomy, ex cranio-brain, and cerebral organoids. They suggested that the brain might be able to show the island of awareness under these situations by using the indirect index of awareness, the perturbational complexity index (Bayne, Seth, & Massimini, 2020). Despite the similarity with the internalistic point of view, they proposed that the independent islands of awareness in a disconnected brain may be in line with just some levels of consciousness.

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These diet-derived signals also alter brain function. AnthelmeBrillat-Savarin (1826) in his book “Physiology of Taste” has a famous quote: “Tell me what you eat and I will tell you what you are.”(Brillat-Savarin, 2012). Like other tissues, the CNS not only obtains energy and nutrients from diet but also utilizes amino acids as the precursors of the neurotransmitters. Dietary proteins and their amino acid contents play an important role in maintaining people's cognitive abilities, and low protein intake may hurt the occurrence of dementia in elder people (Glenn, Madero, & Bott, 2019). The low tryptophan diet causes a decline in serotonin synthesis in the brain, which may influence mood and emotions (Hughes et al., 2003). Dietary omega-3 fatty acids alter expression genes involved in maintaining synaptic function and plasticity in animals. Synaptic plasticity is alterations in synapses between neurons and allows them to adapt to new information (Aiguo). Diets with high saturated fats and refined carbohydrate decline brain-derived neurotrophic factors and subsequently synaptic plasticity in the hippocampus ([R Molteni](https://pubmed.ncbi.nlm.nih.gov/?sort=date&term=Molteni+R&cauthor_id=12088740))

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Several decades ago, the main question in mind philosophy was the material or immaterial origin of the mind. During the 17th century, Descartes skeptically stated that the existence of everything can be doubtful, except for thought and mind. His famous quote was “Cogito ergo sum" (I think; therefore, I am).  He holds that the origin of mind, and soul, is immaterial and supernatural. His theory was named “Dualism” which represents the separation of body and mind. Despite doubting the reality of the body, he suggested the pineal gland as the site for the connection of the soul to the brain. This suggestion was probably because he assumed that most parts of the brain are in pairs, and the pineal gland is just one. However, Descartes's argument has a serious bug: how does an immaterial thing, the mind, influence the body as a physical material? Modern neuroscience proposes that mind qualia including fear, pain, emotions, and perceptual states are physical qualities which are emanated from brain activity and influence the body. There is convincing clinical evidence that damage to distinct parts of the brain can affect mental faculties. Although this physicalist view is not error-free, it is now more dominant among scholars (Tryon, 2014).

Taken together, biomedical data prove that the existence of an areal disconnected brain without any relationship with other parts of the body and the environment is impossible. Blood supplies compounds that cross BBB to CNS. The brain reciprocally regulates nutrient flow in the body. The brain has evolved to maintain energy resources and nutrient flow in the body. Dietary compounds and metabolites of the microbiome are vital signals which exert their effects on the higher part of the brain to regulate decisions, desire, happiness, mood, and so on. Therefore, does a disconnected-brain is offline and separated from the outside world? According to the causality rule, the spontaneous formation of mind in the brain should have an explanation. If external signals are not considered, the only remaining description may be to return to Descartes' dualism

**Paraphrased Version:**

Philosophers have long debated whether an embedded brain in a vat retains consciousness. It has long been assumed that the human experiences are characterized by the interaction between brain, body and environment. However, recent findings have shown that the brain can display some degree of awareness offline without sensory input. In 2020, Bayne and colleagues described situations in which the brain's communication with the outside world is reduced, including cerebral hemispherectomy, ex-craniocerebral, and brain organoids. They suggested that the brain can show an island of consciousness in these situations using an indirect index of consciousness, the Distraction Complexity Index (Bayne, Seth, & Massimini, 2020). Despite the similarity to the internalist perspective, they suggested that the independent islands of consciousness in the isolated brain can only be aligned with certain levels of consciousness.

In the 1980s, Hilary Putnam mentioned Descartes' skeptical view of the reality of a world outside the mind in his hypothetical "brain in a vat" experiment. He requires a brain that has been separated from the body in a container filled with nutrients and factors necessary for its survival and function. The brain was connected to a computer with electrodes. All emotions, perceptions, memories and thoughts were evoked by a computer in a separate brain. Thus, there was no need for external signals throughout the body. Based on this assumption, our perception of the reality of the world may be a computer generated illusion. The Wachowski brothers represented this idea in the Matrix film series. As one of the pioneers of externalization, Putnam believed that we cannot be in a "brain in vat" (Forbes, 1995) because we do not realize that “we are a brain in that” unless instructed by an induction computer.

Currently, the biggest controversy in the philosophy of mind is less about its material/immaterial origins and more about the internal or both internal and external origins of mind. Internalists argue that the events that cause mental phenomena to occur in the central nervous system (CNS) are located inside the human body. They consider the mind to be constant and dependent only on the internal qualities of the individual. Externalities, on the other hand, suggest that factors other than internal parameters interact with messages from the surrounding environment and lead to the development of mental traits. Putnam, in the article entitled "The Meaning of "Meaning" {Putnam,} made a double argument about the influence of external reality on the meaning of concepts in the mind. Avicenna, the famous Iranian philosopher of the 11th century, may have been the first to talk about the fact that we have a separate consciousness, separate from that of our bodies. So, if we keep a person hanging in a dark room with no signal from the environment, they can still be aware of their existence. Although similar to Descartes, Avicenna believed that the mind resided in the immaterial soul, and the floating man argument suggested that man did not need an external signal {Alwishah} for consciousness.

Any theory that asserts an independent role for the brain in the development of mind and consciousness ignores the requirements of a living brain. They assumed that the brain communicates with the outside world only through sensory signals, which were replaced by computers in Putnam's argument.

Although we think we know life, its definition has been debated by philosophers from Aristotle to the latest scientists. Biologists define three main characteristics of life, which are common to all living organisms to avoid philosophical conflicts about the definition of life: 1) methods to obtain energy to maintain its structure and functions; 2) to make a new copy of itself, which is the most important function of living beings; 3) the ability to evolve to become more compatible with its environment. These properties are responsible for the enormous biodiversity on Earth throughout the history of life {Nelson, 2017}.

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Mystical, philosophical and moral thinking is not the main function of the brain. From an evolutionary perspective, the main function of the CNS, especially the hypothalamus, is the hemostatic regulation of energy metabolism for survival and reproduction in harsh environments (Barrett). The CNS receives signals from metabolic tissues to perform homeostatic regulation of metabolism. These inputs include hormones from the gut and adipose tissue, as well as circulating nutrients from foods that cross the blood-brain barrier (BBB). Outputs from the brain, including autonomic efferent nerves, in turn regulate digestion, bowel movements, absorption, and metabolism in major metabolic organs (Hom). Interestingly, peripheral metabolic signals such as metabolites and hormones received by CNS also can influence emotions, behavior, decision making, motivation, and higher cognitive functions. Evidence indicates that metabolic diseases including obesity and diabetes cause mental dysfunction. An obesogenic diet in mice can cause defective production of a cholesterol-derived molecule in specific hypothalamic neurons, which ultimately declines memory (Ramírez). Fat tissue-derived hormone, leptin, alters motivation, learning, memory, cognitive function, neuroprotection, and reproduction by affecting different brain areas (Morrison). Another adipose tissue hormone, adiponectin decreases in obese individuals and may causes mental disorders including dementia and Alzheimer’s disease (Forny). Obesity Shows Correlation with Mood Conditions Like Depression Through Alterations of the Hypothalamic-Pituitary-Adrenal Axis (Sylvia).

These diet-derived signals also alter brain function. AnthelmeBrillat-Savarin (1826) in his book entitled “Physiology of Taste” has a famous quote: “Tell me what you eat and I will tell you what you are.”(Brillat-Savarin, 2012). Like other tissues, the CNS not only obtains energy and nutrients from diet but also utilizes amino acids as the precursors of the neurotransmitters. Dietary proteins and their amino acid contents play an important role in maintaining people's cognitive abilities, and low protein intake may hurt the occurrence of dementia in elder people (Glenn, Madero, and Bott, 2019). The low tryptophan diet causes a decline in serotonin synthesis in the brain, which may influence mood and emotions (Hughes et al., 2003). Dietary omega-3 fatty acids alter expression genes involved in maintaining synaptic function and plasticity in animals. Synaptic plasticity is alterations in synapses between neurons and allows them to adapt to new information (Aiguo). Diets with high saturated fats and refined carbohydrate decline brain-derived neurotrophic factors and then synaptic plasticity in the hippocampus (R Molteni)

There is significant evidence for the link between mental disorders and imbalance in intestine bacteria or symbiosis. Experimental studies reveals that germ-free animals have altered neurotransmitter synthesis and degradation, which subsequently affect stress reactivity and anxiety-like behavior(Carabotti). Tryptophan as a precursor of serotonin is consumed by some types of intestinal bacteria. The reduction of this microbial population causes an increase in the amount of serum tryptophan or serotonin production, which finally increased mood and decreases anxiety, in animal models (Neufeld, Kang, Bienenstock, and Foster, 2011). In the feces of patients with severe depression, either an increase in harmful microbes or a decrease in beneficial intestinal bacteria has been found (Jiang et al., 2015). Humans and microbes are inextricably intertwined as if we have never been alone. It even seems that the alteration in dietary patterns in the modern era affects our way of thinking and feeling. Fast foods with harmful fat alter the ability to learn, think and memorize and provoke depression, anxiety, and dangerous behavior in adolescents (Lowe, Morton, and Reichelt, 2020).

A few decades ago, the main question in the philosophy of mind was the material or non-material origin of the mind. In the 17th century, Descartes observed with skepticism that the existence of anything other than thought and reason could be in doubt. His famous quote was "Cogito ergo sum" (I think; therefore, I am). He says that the origin of soul and spirit is immaterial and supernatural. His theory was called "dualism", which represents the separation of body and mind. Although he doubted the reality of the body, he proposed the pineal gland as the place where the soul connects to the brain. This suggestion was probably due to his assumption that most parts of the brain are paired and that the pineal gland is only one. However, Descartes' argument has a major flaw: how does an immaterial thing, the mind, affect the body as physical material? Modern neuroscience suggests that mental qualities, including fear, pain, emotions, and perceptual states, are physical qualities that arise from brain activity and affect the body. There is strong clinical evidence that damage to specific parts of the brain can impair mental ability. Although this physical view is not without its flaws, it is the dominant one among scientists today (Tryon, 2014).

Taken together, the biomedical data suggest that it is impossible to have a flat-slice brain that is not connected to other body parts and the environment. Blood provides the connections that pass from the BBB to the CNS. In turn, the brain regulates the flow of nutrients in the body. The brain evolved to maintain energy reserves and the flow of nutrients throughout the body. Nutrients and microbiome metabolites are important signals that influence the upper part of the brain to regulate decisions, appetites, happiness, mood, and more. So the specific brain is offline and disconnected from the outside world? According to the principle of causality, the spontaneous formation of intelligence in the brain must have an explanation. If external cues are not taken into account, the only description left can be a return to Descartes' dualism