According to functionalism, mental phenomena are defined in terms of the external input and the observable output of a system. So mental states are defined by their causal relations. There is nothing specifically mental about the so-called mental states. These consist entirely in their causal relations to each other and to the inputs and outputs of the system of which they are a part. There are only causal relations between consciousness and brain processes. In this chapter, I will discuss how functionalism itself has been shown to fail to explain consciousness in terms of the mechanical model of the mind. Consciousness has been found to be the residual states of the computational functions of the mind. The cognitive mental states and processes are always related with the phenomenon of consciousness. Therefore, it is imperative to investigate the nature of cognition in relation to consciousness.

I. Varieties of Functionalism

We have already discussed in the previous chapter that for functionalism, the mental states are functional states. That is, the mind is a complicated machine and mental processes are computational process which can be realized in a machine. Mental states are realized by their relations to their sensory stimulation or input or by other inner states or their behavioural aspects. Consciousness would be a mental process with certain kinds of causal relations to the inputs. There are so many different varieties of functionalism, each based on a different model, and all of which try to specify the different sorts of input—output relations. The main concern of functionalism is to specify the relations between different sorts of thought and behavior. It tries to individuate mental states causally, as mental states have mental causes and effects as well as sensory causes and behavioural effects. According to Shoemaker:
...functionalism is the view that mental states are definable in terms of their causal relations to sensory inputs, behavioural outputs, and other mental states.¹

Functionalism explains that our mental states are naturally related to what goes on in the brain or the central nervous system. Mental states, however, are not necessarily brain states. In any case, they are physical states and are related with each other through causal relations. For example, an intelligent robot has mental states but its thinking depends on silicon chips rather than on biological neurons.

According to strong functionalism, our concept of a particular mental state type has a state whose tokens have a strictly defined causal-functional role or ultimately sensory input and behavioral output. For every psychologically distinct type of mental state M, there is a distinct corresponding functional role R.² In case of moderate functionalism, for every psychologically distinct type of mental state M, there is some functional role R, which can be assigned to M. In this case, which functional role corresponds to which type of mental state has to be determined by empirical investigation. According to M. Lockwood, "from a functionalist standpoint, be it strong, moderate or weak, we have no guarantee that your pains and mine will, in physical respects, be all that similar: what it is that plays the causal-functional role of pain in my brain, might, in physiological terms, be something very different from what plays that role in yours."³

A common functionalist claim is that the same mental state can physically be realized in a variety of ways. That is, for every mental state M, there are different ways of realizing it. What matters is the functional organization of the state and not the stuff out of which it is made. This is called multiple realizability theories. In his essay "Mad Pain and Martian Pain",¹ Lewis discusses two kinds of beings, which experience pain differently than normal humans. In the case of mad pain, the subject experiences pain when doing moderate exercise in an empty stomach; further, it improves his concentration for mathematical reasoning. On the other hand, Martian pain takes place in a Martian organism constructed of hydraulic hardware rather than neurons. Here the point is that pain is associated only contingently with either its causes (as in mad pain) or its physical realization
(as in Martian pain). We cannot specify a priori its causal role or physical realization.

There can be indefinitely many different physical properties, which constitute the realizations of the same functional property. However, "it is also true that the same physical state can realize different functional properties at different times or in different circumstances or in different creatures." The functional states are "multiply realizable" in the sense that a functional state cannot be identical to any particular physical realization of it. For example, someone could write a program using two completely different types of computer, which use different sorts of hardware to run the same program. In this sense, the program said to be "multiply realizable" in that any number of computers may be used to realize the same program. Functionalism takes states of mind and mental properties to be functional states and properties. Mental properties are realizable by, but not identical with, material properties. For example, the same mental property, the property of being in pain, may be realized by one property in a human being and to a certain extent by another properly in an invertebrate. For the functionalist, if someone has now a particular pain, then he/sh can imagine that this pain is realized through a particular neural state. That neural state has an identifiable material structure, and this may be studied by a lower-level hardware science like neurobiology. Therefore, for functionalism, what makes the state a realization of pain, is not its material constitution but its occupying a particular kind of causal role within our nervous system. Multiple realizability thus implies that there is a higher-level functional description of physical states in terms of their causal role which abstracts from their lower-level physical constitution. It is with such functional properties that mental properties can be identified.

Ned Block identifies three kinds of functionalism. The first is simple decompositional functionalism, which refers to a research programme that relies on the decomposition of a system into its components, and then the whole system is explained in terms of these functional parts. Secondly, computation-representation functionalism that describes mind as a computer (computer-as-mind analogy). Psychological explanation under computation-representation functionalism is "akin to providing a computer program for the mind." Thus,
mental processes are seen as being decomposable to a point where they can be thought of as processes that are as simple as those of a digital computer or similarly a Turing machine. Lastly, Block identifies metaphysical functionalism. This form of functionalism is a theory of mind that hypothesizes that mental states simply are functional states. The metaphysical functionalist claims that mental states are functional states because they have the causal relations between inputs, outputs and other mental (i.e. functional) states of the system, as in the Turing machine.

Machine functionalism describes human brains in three levels. The first two are scientific levels such as biological, (neurophysical) and the machine-program or computational. Third is the common sense level of folk-psychology. At the first level, biologists describe human neurobiology in functional terms and make available neurophysiological descriptions of brain states. At the second level, psychologists work out the machine program that is realized by the lower-level neuroanatomy and describe the same brain states through more abstract computational terms. At the third level, psychologists also explain behaviour, characterized in everyday terms, by reference to stimuli, and to the intervening mental states such as beliefs and desires, type-identifying the mental states with functional or computational states as they want.

H. Putnam has compared mental states to the functional or logical states of computer or a computer program, which can be realized by any of a number of physically different hardware configurations. The different hardware configurations may have different physical and chemical properties. Putnam believes that the psychological properties of human beings are not the physical and chemical properties of human beings, although they may be realized by the physical and chemical properties of human beings. Thus, functionalism does not reduce psychological properties to physical properties.

Functionalism as a theory of mind espouses the “multiple realizability” theories. Both analytic functionalism and psycho-functionalism agree that there are conceivable creatures in which mental states have very different physical realizations. If we think of mental states in this way- that is, as "multiply
realizable”, then it is possible that one day, a machine that can “think”, or be artificially intelligent. In this way, the process of thinking would be comparable to a computer program that could run on different types of machine.

Putnam’s Turing machine functionalism explains that the machine receives input, carries out the instructions of the input program, changes its internal state and produces an appropriate output based on the input and instructions. Machine functionalists claim that the mind is like a Turing machine. They argue that we can easily understand functionalism through the relationship between a computer and its program. The hardware of a computer is that which is actually made out of the system of operations, which are carried out by it. The software, on the other hand, is the program, the system of operations, which the hardware carries out. The software can usually be modified for use in a number of different systems. This involves a complicated system of instructions to the computer hardware, which can physically be carried out in a number of different ways, but achieving the same result.

Ned Block discusses the difference between Functionalism and Psychofunctionalism with the help of the Ramsey sentence of a psychological theory. According to him:

Mental-state terms that appear in a psychological theory can be defined in various ways by means of the Ramsey sentence of the theory... All functional state identity theories ... can be understood as defining a set of functional states... by means of the Ramsey sentence of a psychological theory—with one functional state corresponding to each mental state. The functional state corresponding to pain will be called the ‘Ramsey functional correlate’ of pain, with respect to the psychological theory. In terms of the notion of a Ramsey functional correlate with respect to a theory, the distinction between Functionalism and Psychofunctionalism can be defined as follows: Functionalism identifies mental state S with S’s Ramsey functional correlate with respect to a common-sense psychological theory; Psychofunctionalism identifies S with S’s Ramsey functional correlate with respect to a scientific psychological theory.9
The functionalist thinks that all of our mental states can be defined in terms of functional states. The functional states play causal roles in the system. It does not matter what the intrinsic make-up of those states is. In humans, they are certain kinds of brain states. In Martians, they would likely be different sorts of states. In an appropriately programmed computer, they would be electronic states. These would be different physical realizations of the same causal roles. The functionalists thus identify our mental states with the causal roles.

According to Ned Block, functionalism is guilty of physicalism. Because, for the functionalist, ‘pain’ is identical to a physical state, or it is a first-order physical property (token physicalism). However, some philosophers do not accept this. They argue that, if functionalism is true, then physicalism is probably false. If pain is a functional state, it cannot be a brain state, because creatures without brains can realize the same Turing machine programme as creatures with brains.

Block’s first objection to common-sense functionalism is that it is too ‘liberal’, that is, it attributes mental states to too many things, including things which intuitively have no mental life. He gives an example:

Imagine a body externally like a human body, say yours, but internally quite different. The neurons from sensory organs are connected to a bank of lights in a hollow cavity in the head. A set of buttons connects to the motor-output neurons. Inside the cavity resides a group of little men. Each has a very simple task: to implement a •“square” of an adequate machine table that describes you. On one wall is a bulletin board on which is posted a state card, i.e., a card that bears a symbol designating one of the states specified in the machine table. Here is what the little men do: suppose the posted card has a ‘G’ on it...Suppose the light representing input I_{17} goes on. One of the G-men has the following as his slows task: when the card reads ‘G’ and the I_{17} light goes on, he presses output button O_{191} and changes the state card to ‘M’... In spite of the low level of intelligence required of each little man, the system as a whole manages to simulate you because the functional organization they have been trained to realize is yours.
If, according to him, the functional roles are constitutive of mental states, then it does not simply follow from the truth of functionalism that they are physical states at all. Block gives another example of China-brain argument in which the citizens of China replace the homunculi. He argues that in both cases the common-sense functionalist is committed to saying that the system has mental states like our mental states, and the system has the same functional organization that we have. However, he rejected this view because these systems do not have seem to have any mental states. In both cases, the Homunculi-head and the China-brain have prepositional attitudes, but it is doubtful whether they have any qualitative mental states, like pain or perceptual experiences. So common-sense functionalism is wrong in the sense that the systems with functional organizations very similar to ours do not have mental properties at all. Having mental states is qualitatively very different from having certain functional organization.

The psychofunctionalist is concerned with systems, which are functionally equivalent in common sense respects and also in terms of the functional characteristics of their underlying cognitive mechanisms. However, there are important functional differences between the cognitive mechanisms in our brains and the mechanisms in the Homunculi-head and China-brain. Psychofunctionalism is therefore not committed to saying that those systems have mental states. Block's view is that psychofunctionalism still has troubles accounting for qualitative states like pain and perceptual experiences. He gives an inverted spectrum argument to try to show that experiences may differ qualitatively even though they have the same causal role. Therefore, the qualitative features of experience cannot be defined in functional terms. He complains that psychofunctionalism is too "chauvinist", that is, it denies mental states to too many things, including things which intuitively have those mental states. He gives an example in which we encounter Martians who are equivalent to us in all common-sense functional respects, but not in terms of their underlying cognitive mechanisms:

We develop extensive cultural and commercial intercourse with the Martians. We study each other's science and philosophy journals, go to each other's movies, read each other's novels, etc. Then Martian and Earthian psychologists compare notes, only to find that in underlying
psychology. Martians and Earthians are very different... Imagine that what Martian and Earthian psychologists find when they compare notes is that Martians and Earthians differ as if they were the end products of maximally different design choices (compatible with rough functional equivalence in adults). Should we reject our assumption that Martians can enjoy our films, believe their own apparent scientific results, etc.?…

Surely there are many ways of filling in the Martian/Earthian difference I sketched on which it would be perfectly clear that even if Martians behave differently from us on subtle psychological experiments, they nonetheless think, desire, enjoy, etc. To suppose otherwise would be crude human chauvinism."

The common-sense functionalists specify inputs in terms of light and sound falling on one’s sense organs, and output as movements of arms and legs. They define mental states in terms of causal relations to these inputs and outputs. The creatures, which are capable of having those mental states, will have inner states standing in causal relations to inputs and outputs of those sorts. But what about creatures that lack our sense organs, and lack arms and legs? What about creatures with different neural structures than ours or creatures with no neurons? These non-human creatures obviously will lack mental states, according to functionalism. That will be a kind of chauvinism according to Block.

Functionalism accepts the idea that, according to such a view of the mind, it is possible to imagine zombie-like, non-conscious creatures that do not possess ‘qualia’. Such creatures, which fulfill the functionalist criteria for possessing a mind, could not be said to be human in the full sense of the term. In other words, the non-functionalists argue that qualia are necessary in addition to any functionalist explanation in order to account for minds. Functionalism agrees that brain states are responsible for mental states, but disagrees that they are identical with them. It argues that neurological states or brain activities help to realize mental states, which then lead to behaviour. In this way, it solves the main problems by proposing that brain states are "low level" activities that help realize "high level" mental states. To understand this point, we discuss example of a computer. Suppose we ask a computer to add the numbers 3 and 7. On one level-
at a low level, what is happening in the computer is dependent on the hardware; on another level - a high level - the computer's software is calculating the answer. Since, computers have different hardware that works in different ways, we cannot describe the process of calculation as the activity of hardware. However, the functionalist argues that the process of calculation is simply realized by the hardware. Therefore, the software is a function of the hardware.

For a functionalist, consciousness would be a mental process with certain kinds of causal relations to the inputs, to other mental states or processes, and to certain behaviours. One can also posit the existence of zombies, unconscious beings that have the same behaviour and the same brain states as a conscious being, but have no qualia. However, the functionalist theory fails to prove the qualitative aspect of mind- what it is like to be consciousness. Because it is possible to say that brain states cause consciousness, or that functional slates are caused by brain states, but these things do not tell us how the subjective experiences themselves arises. The problem with this is that our subjective experiences are the most real for us. We know what it is to feel pain or to remember being at the park, but the functionalist view does not look like to include this picture.

11. Artificial Intelligence

In the last section, it is discussed how functionalism fails to explain consciousness in terms of the mechanical model of the mind. Now we will discuss: Where is the place of consciousness in artificial intelligence? AI is the theory that believes that it is possible for a machine to ‘think’. It supposes that computers are thinking intelligent machine. Now we face the question: Can AI prove consciousness in a machine? According to AI, the human brain is like a digital computer, and the human mind is just a computer program. It tries to prove that the relation between the programs and the computer hardware is like the relation between mind and brain. Some supporters of AI argue that we have every reason to believe that computers have intelligence. At the same time, some others argue that computers' intelligence is limited whereas human intelligence has no limit. Nowadays computers have achieved some modest success in proving
theorems, guiding missiles, sorting mail, driving assembly-line robots, diagnosing illness, predicting weather and economic events, etc. Computers receive, interpret, process, store, manipulate and use information. Thus, intelligent behaviour is programmed into the computers. On the contrary, we have no idea how the brain functions, but we have an idea of the general relationships between brain processes and mental processes. Mental processes are caused by the brain activities which are functions of the elements constituting the brain.

The main aim of AI is to reproduce mentality in computational machines, and to try to prove that the functions of a machine are similar to the functions of the human mind. But the question is: Could a machine have mental states? For AI, in the words of Searle:

...there is nothing essentially biological about the human mind. The brain just happens to be one of an indefinitely large number of different kinds of hardware computers that could sustain the programs, which make up human intelligence. On this view, any physical system whatever that had the right program with the right inputs and outputs would have a mind in exactly the same sense that you and I have minds. [4]

Searle is here critical of the view that any physical system that has the right program with the right inputs and outputs would have a mind in exactly the same sense that human beings have minds. The cognitive scientists believe that perhaps they can design the appropriate hardware and programs - artificial brains, and minds- that are comparable to human brains and minds. However, here the question arises: is it possible that a machine can have consciousness like sensation and feelings?

Searle has discussed the difference between man and machine by highlighting the notion of understanding. Through his ‘Chinese room’ argument, he has proved that a computer has syntax, but no semantics. For a human being, to understand a language involves more than just having a bunch of formal symbols. It involves having an interpretation, or a meaning attached to those symbols. A digital computer deals with or manipulates only formal symbols, because the function of the computer is defined in terms of its ability to realize programs.
These programs are purely formal as they have no semantic content and have only syntactical structures. Human minds are semantical by nature, because they have more than a formal structure, they have content. Computer programs, on the contrary, are entirely defined by their formal, or syntactical structure.

Searle writes:

No computer program by itself is sufficient to give a system a mind. Programs, in short, are not minds, and they are not by themselves sufficient for having minds. . . For any artefact that we might build which had mental states equivalent to human mental states, the implementation of a computer program would not by itself be sufficient. Rather the artefact would have to have powers equivalent to the powers of the human brain.13

Searle makes a distinction between strong AI and weak AI. Strong AI argues that it is possible that one day a computer will be invented which can function like a mind in the fullest sense of the word. In other words, it can think, reason, imagine, etc., and do all the things that we currently associate with the human minds. On the other hand, weak AI argues that computers can only simulate human mind and are not actually conscious in the same way as human minds are. According to weak AI, computers having artificial intelligence are very powerful instruments in the hands of man. Whereas Strong AI holds that computer is not merely an instrument in the study of the mind, but the appropriately programmed computer is really a mind in the sense that computers can think and do reasoning like the human beings. In Strong AI, the programmed computer has cognitive states, so the programs are not simple tools that allow us to test psychological explanations; rather the programs are themselves the explanations. Strong AI, according to Searle, basically claims that the appropriately programmed computer literally has cognitive states, and that the programs thereby explain human cognition.

The main point of Searle’s Chinese Room thought experiment was to show that the syntactic manipulation of formal symbols does not itself constitute semantics. The implications of this thought experiment for computationalism and strong AI are the following: first, computationalism fails because the formal
syntax of a computer program has been shown not to be intrinsically semantic, and second, strong AI fails because a system behaving as if it had mental states, is insufficient to establish that it has these states. The mental states have intentionality which cannot be reproduced by a computer program.

R. Penrose discusses this nature of consciousness and computation, and provides an answer to the question whether our feelings of conscious awareness of happiness, pain, love, aesthetic sensibility, will, understanding, etc. can fit into a computational model of mind. Will the computers of the future actually have minds? He gives answer with four points:

(a) All thinking is computation; in particular, feelings of conscious awareness are evoked merely by the carrying out of appropriate computations.

(b) Awareness is a feature of the brain’s physical action; and whereas any physical action can be simulated computationally, computational simulation cannot by itself evoke awareness.

(c) Appropriate physical action of the brain evokes awareness, but this physical action cannot even be properly simulated computationally.

(d) Awareness cannot be explained by physical, computational, or any other scientific terms. Awareness, understanding, consciousness, intelligence, perceptions are all our intuitively given mental activities. These cannot be computationally explained according to Penrose. Thus, according to him, for example, ‘intelligence’ requires ‘understanding’ and ‘understanding’ requires ‘awareness’. Awareness is a basic feature of consciousness. These mental activities are basic to the human mind. Penrose remarks:

... a person's awareness is to be taken, in effect, as a piece of software, and his particular manifestation as a material human being is to be taken as the operation of this software by the hardware of his brain and body. However, human awareness and understanding are not the result of computations understanding by the brain. Understanding is the inborn activity of the human mind which cannot be simulated by the computer. Human understanding cannot be replaced by computer simulations. The strong AI, much
against our ordinary understanding of the mental activities, try to reduce them to computational functions. In the words of Penrose:

Thus, according to strong Al, the difference between the essential functioning of a human brain (including all its conscious manifestations) and that of a thermostat lies only in this much greater complication (or perhaps "higher-order structure" or 'self-referential properties', or some other attribute that one might assign to an algorithm) in the case of a brain. Most importantly, all mental qualities - thinking, feeling, intelligence, understanding, consciousness - are to be regarded, according to this view, merely as aspects of this complicated functioning; that is to say, they are features merely of the algorithm being carried out by the brain. 16

It is, therefore, obvious that the strong Al cannot explain the mental activities properly.

Some philosophers believe that consciousness is a computational property, but the problem is nobody, today, knows how to design a conscious machine. McGinn discusses the word 'machine' in two ways, i.e. narrow sense and wide sense. The narrow sense refers to those machines, which are constructed by human beings such as motorcars, typewriters, pocket calculators, office computers, etc. In these machines, consciousness cannot be found. In the wide sense of the word "machine", there are mechanical devices, which are the artefacts or the intentional products of some kind of intelligence. Here the question arises whether an artefact could be conscious. McGinn puts forward the following questions:

(a) Could a human artefact be conscious? (b) Could an artefact of any conceivable intelligence be conscious? 17

The first question concerns whether human beings can produce a conscious artefact with his superior technological power. It is like asking whether we shall ever travel to another galaxy. The second question raises the issue of whether the concept of an artefact is such as to eliminate the possession of consciousness. McGinn does not rule out the possibility that an artefact could be conscious. According to him:
Suppose there were an intelligence clever enough to create beings physically just like us (or bats). Then I think this intelligence would have created conscious beings. ... If we are the artefacts of God, this is not a reason to suppose ourselves unconscious. After all, there is a sense in which we are artifacts: for we are the products of natural selection operating upon inorganic materials to generate brains capables of subserving consciousness.\textsuperscript{18}

In the wider sense, the human beings are artefacts of nature and are conscious. Even then, all artefacts like tables and chairs are not conscious. Consciousness is an intrinsic property of organisms, and so in the strict sense, only organisms are conscious. That is, only living things can be conscious, and so a conscious being must be animate, organic, and alive. As Wittgenstein puts it:

\ldots only of a living human being and what resembles (behaves like) a living human being can one say: it has sensations; it sees, is blind, hears, is deaf, is conscious or unconscious.\textsuperscript{19}

Here he is making a conceptual link between being conscious and being alive. According to this view, a conscious being either must be alive or must be like what is alive, where the similarity is between the behaviour of the things in question. In other words, only of what behaves like a living thing we can say that it is conscious. Our concept of a conscious state is the concept of a state with a certain sort of behavioural expression. We cannot really make sense of a conscious stone, because the stone does not behave like a conscious being. The point is that being biologically alive is not a necessary condition of consciousness, but it is necessary that a conscious being should behave like a living thing. Thus, instead of identifying consciousness with the material composition of the brain, we should identify it with certain higher-order properties of the brain, which manifest in conscious behaviour. For example, pain is a higher-order property of physical states, which consists in having a certain pattern of causes and effects, and certain outward behaviour.

Now coming back to the problem of AI, it goes without saying that machines do not have consciousness. The so-called artificial intelligence does not entail consciousness. The computing machines of AI are limited in a way that
human beings are not. so that it is out of the question for a conscious mind to arise merely in virtue of computation.

D.Chalmers discusses in his masterly work *The Conscious Mind* objections to AI under two categories, namely external objections and internal objections. In case of external objections, he tries to establish that computational systems could never even behave like cognitive systems. The internal objections, on the other hand, admit that at least the computers may reproduce human behaviour, but they would lack minds all the same. It suggests that they would have no inner life, no conscious experience, no true understanding. According to the external objections, there are certain functional capacities that humans have, but computers do not. However, it seems that we have good reason to believe that the laws of physics are computable, so that at least we should able to study human behaviour computationally. But that does not entitle us to infer that neural processes in a brain give rise to consciousness. The computers lack not only the human brain, but also the inner conscious life of man.

It may be argued that our brains are like the digital computers, since they implement any number of computer programs. And, of course, our brains can think. So the question is: Can a digital computer think? Is implementing the right computer program with the right inputs and outputs sufficient for or constitutive of thinking? The answer is "no". Because the computer program is defined properly syntactically, whereas thinking is more than just a matter of manipulating meaningless symbols. If involves meaningful semantic contents. If really it is a computer, its operations have to be defined syntactically, whereas consciousness, thoughts, feelings, emotions and the rest of it involve more than syntax. For the strong AI, the mind is purely formal; so it cannot be treated as a concrete product of biological processes like any other biological product. For it, the mind is more than a part of the natural biological world; it believes that the mind is purely formally specifiable.

For Scarle, on the contrary, consciousness, intentionality, subjectivity and mental causation are all a part of our biological life history, along with growth, reproduction, etc. No computer program by itself is sufficient to give a system a
mind. Programs are not minds and they are not by themselves sufficient for having minds. When it is said that it is impossible for a machine to be conscious, it is not always clear to what extent this is intended to be a logical objection, and to what extent empirical. The question, whether a machine can be conscious, depends on its successful emulation of the behaviour of a man who, we should all agree, is conscious. If a man answers smartly, when we whisper his name behind his chair, then we have no doubt that he is conscious. However, a machine may respond to the same sound frequently with the same reply and we should not feel satisfied that it was conscious. We thus know that the question of consciousness can be raised only with regard to living beings and not regarding machines. Consciousness is not a property which can be detected in a machine by any physical examination, because it cannot be identified with any physical characteristics of a machine. Nor can it even be correlated with them, as the color red can be correlated with certain wavelengths of light. The fundamental element in these correlations is the subjective experience, and it is exactly this element whose presence in the robot is in question.

The mistake in the case of consciousness is to ignore its essential subjectivity and try to treat it as an objective third person phenomenon, whereas consciousness is essentially a subjective, qualitative phenomenon, first person perspective. The most common mistake about consciousness is to argue that it can be analysed behavioristically or computationally. It is a mistake to suppose that, for a system to be conscious, it is both necessary and sufficient that it has the right computer program or set of programs with the right inputs and outputs. A traditional objection to behaviorism was that behaviorism could not be right because a system could behave as if it were conscious without actually being conscious. There is no logical connection, no necessary connection between inner, subjective, qualitative mental states and external, publicly observable behavior. Of course, conscious states characteristically cause behavior. However, the behavior that they cause has to be distinguished from the states themselves.

The computational model of consciousness is not sufficient for explaining consciousness, because computation is defined syntactically. It is defined in terms of the manipulation of symbols. However, the syntax by itself can never be
sufficient for the sort of contents that characteristically go with conscious thoughts. Syntax by itself does not generate the semantic content. Semantic content is intrinsic to the human mind. However, computation does not name an intrinsic feature of reality but is observer-relative, and this is because computation is defined in terms of symbol manipulation. Something is a symbol, only if it is used as a symbol. The Chinese room argument of Searle’s shows that semantics is not intrinsic to syntax. Something is a symbol only relative to some observer, user or agent who assigns a symbolic interpretation to it. Computation exists only relative to some user or observer who imposes a computational interpretation on some phenomenon.

III. The Representational Theory of Mind

What is the function of our mental states? In answering this question, the representational theory of the mind states that mental states are representational states and mental activity is the activity of acquisition, transformation and use of information. The central question is: How can mental phenomena and symbols be about things? Fodor suggests that the mind-cum-brain is not merely representational and computational, but also functional. The mind is an aspect of the brain. According to him:

...to describe human beings as having beliefs or desires or hopes or wants or any of the other propositional attitudes is to describe the cognitive functions of human being. Humans really do have beliefs and desires and hopes and wants, or at least something very like them, in their heads.¹

He further says that:

...unless we limits our claims about individual mental functions to those case where there exists a computational mechanism that can carry out the function and where we have at least some idea of what such a mechanism must be like, we are likely to be dealing in functionalist 'pseudo-explanations.'²

According to Fodor, from functionalists view, if there are no computational processes in the brain, then we can claim anything what clue we like within our heads. However, we have a 'universal question-answerer' process in our head
with a functional capacity and it produces answer (output) whenever ask question (input).

We can understand the intentional states in our mind, if we accept that beliefs and desires are real, and that they represent intentional mental states in the form of sentences that Fodor calls as the ‘language of thought’. Intentionality or the capacity to have informational content is a feature of our brains. For Chomsky, the language of thought will be some natural language, the learning of which is made possible by our universal grammar. This universal grammar is the universal ability to learn natural languages, not a language for representing concepts or the contents of propositional attitudes or anything else. Whereas Fodor believes that we must have a universal language of thought or ‘language of the brain’, in terms of which we really do our thinking (or do our mental computation).

In the case of computer analogy, the language of thought is like the binary machine code understood by the hardware. It exists between the hardware and software as a way of representing the machine's states in a form, or syntax, that is clear for humans, and that can translate into human readable languages. For example, a belief that "it is cold" is a matter of somebody's feeling of the cold, forming a belief that it is cold in a sentence in the language of thought with an appropriate functional role, and then translating this belief into the English language, "it is cold".

The language of thought is a system of representations, and it is the way we can understand how a mind that is understood as a higher-level entity could systematically correspond with the bodily functions. It provides both semantic content and syntactic form to the thoughts and the human language sentences.

Chomsky says that we have strong grounds, from empirical data about natural languages for positing a universal grammar, or universal competence for generating our different natural languages. Similarly, Fodor believes that we have strong empirical grounds for positing a real innate language or representational system, which is the basis for our universal capacity to learn natural languages. The RTM assumes that symbols do not have intrinsic meanings, and that their
meaning depends upon how they are deployed. It also suggests that symbols in our language of thought have meanings only insofar as we assign them meanings. The term ‘language’ in the language of thought applies strictly to some parts of our brain language than to any natural language. It is clear that what is common in both the brain language and the natural language is that they are all representational. According to Fodor. "there are compelling reasons derived from linguistics for asserting, one cannot learn a language unless one has a language."  

Fodor claims that a person could not use correctly any predicate of any natural language, unless in some way he/she could represent to himself/herself in a language that stands behind and is developed mentally before the natural language. Fodor says:

If we reflect for a moment upon the nature of our ubiquitous companion the computer, we will experience less resistance to this whole notion of a brain language, for a digital computer computes in one language but communicates with the programmer in another.

The computer’s internal machine language is unique to the computer, and so in that sense, private to the computer. The programming language, on the other hand, is the medium of communication between programmer and machine, and is what appears on printouts for the use of others, and so in that sense, it is a fully public language. The two languages, the private machine language and the public programming language are connected in the machine by means of an "innate" compiler. The RTM entails that any propositional attitude, such as a belief that so-and-so or a desire that such-and-such, is literally a computational relation between an organism and some formula in the internal code of that organism. The formula is the object of the propositional attitude in question. This internal formula is a piece of information represented in the case of humans, in the brain’s language of thought. As Fodor puts this:

To believe that such and such is to have a mental symbol that means that such and such tokened in your head in a certain way: it's to have such a token in your belief box. Mental processes are causal sequences of tokenings of mental representations.

In the language of thought, thus, the mental states are symbolically represented and causally connected.
Fodor points out that an important general consequence of adopting the RTM is the preservation of the independence and autonomy of psychology. If the representation theory gives us an accurate picture of how the brain works, then the psychological explanation will be computational ones in terms of the relationship of the propositional attitudes. The relationship of the propositional attitudes will be explained in terms of the various ways of processing contents, which are represented in the language of thought. The psychological explanation would involve intentional vocabulary at this level. Therefore, it would follow that psychological explanations could never be reduced to the non-intentional explanations of neuro-physiology or even the more basic ones of physics and chemistry.

The RTM accepts the mental representations as very similar to the internal representational states of a digital computer. The mental representations represent in no stronger sense than the punched cards of a Jacquard loom represent. Fodor tells us that the propositional attitudes are really in the head. We must have in our heads a representational system, which is more like a natural language than any other representational system. The propositional attitudes like belief and desire are basic to our understanding of the mental representation. The RTM provides a way of understanding how minds, higher-level entities, function like digital computers and yet retain the intentionality of the mental representations.

The RTM tries to explain how the representational menial states such as belief, desire, hope, doubt etc. represent or have content, and how the contents of the various mental states influence the causal interactions of the various mental states and the production of overt behaviour. According to Fodor, by providing a relational treatment of the propositional attitudes, it is possible to state how they have content. According to the relational treatment, propositional attitudes are related with the organism and its internal mental representation. For example, the mental state, ‘belief’, represents its content because of its relation to the other internal mental representations.
Fodor gives two reasons in support of the relational treatment of the propositional attitudes. First, it is intuitively plausible that propositional attitudes are relations. For example, when John believes something, it seems that John stands in relation to something, i.e., the object of belief. Secondly, existential generalizations apply to the objects of propositional attitudes. If John believes it is raining, then we can undoubtedly say that there is something, which John believes. It shows that belief is a relation between John and something that he believes. According to Fodor, the representational entities are sentences or formulae of an internal language of thought or mental state. John's belief state is about rain because of a formula of the internal language of thought that is about rain. The internal language of thought is universal in the sense that any system that possesses our psychology should have the same system of internal representations with the same syntax and semantics.

Computational Representational Theory of Mind (CRTM) provides a two-fold way of type-individuating mental states, that is, they can individuate on the basis of either computational relation or the content of the representations. The belief that the earth is round is differentiated from the belief that the earth is flat, because of the differences in the contents of the series of symbols that express the corresponding proposition. Similarly, the belief that earth is round is differentiated from the doubt that the earth is round, because of the differences in computational relations. The Computational Representational Theory of Mind holds that, for explanations in cognitive psychology, we should take into account only the formal aspects of the mental states. Semantic notions such as truth, meaning and reference do not have any explanatory role in cognitive sciences, because the semantic notions do not figure in the psychological categories. According to Fodor:

The idea that mental processes are basically formal is in a sense the reformulation of the Cartesian claim that the character of mental processes is somehow independent of environmental causes and effects.

According to Fodor, mental representations have two basic concerns such as, first, it must specify the intentional content of mental states, and secondly, the
symbolic structure of mental states must define the functions of the mental processes. The specification of intentional content of mental states or cognitive states describes its relationship that is held between the propositional attitudes and the intentional content. Though the primary aim of advocating the notion of mental representations is to give a realistic account of propositional attitudes.

For Fodor, mental states are token neural states. All the token mental states are syntactically characterized, by characterizing the mental or cognitive states as purely syntactical or symbolic in their forms. According to Fodor:

...the very function of the brain organism and the cognitive states is such that it has a specific mechanism which transforms the representations into the internal representations. That is why, all the cognitive states are known as internal representational states. By cognitive architecture, Fodor means the causal network of the cognitive or mental states. The cognitive architecture defines the mental processes. Fodor writes:

One might think of cognitive theories as filling in explanation schema of, roughly, the form: having the attitude R to proposition P is contingently identical to being in computational relation C to the formula (for sequence of formula) F. A cognitive theory, in so far as it was both true and general, would presumably explain the productivity of propositional attitudes by entailing infinitely many substitution instances of this schema: one for each of the propositional attitudes that the organism can entertain.

On this account, symbols are formula of the internal code. There are two levels of functions in so far as the determination of content is concerned. They are the symbolic structure of mental states whose function determines the intentional content of the propositional attitudes and the other in the neural process. These two levels are causally related in the sense that causal law is applied to the function of mental or representational states. According to Fodor, each mental state is identical with a brain state. The mental or representational states have causal properties, thus relating the symbolic structure of mental or cognitive states with the neural processes. Fodor writes:
... the causal roles of mental states typically closely parallel the implication of structures of their propositional objects; and the predicative success of propositional-attitudes psychology routinely exploits the symmetries thus engendered...the structure of attitudes must accommodate a theory of thinking; and that it is pre-eminent constraint on the latter that it provides a mechanism for symmetry between the internal roles of thoughts and their causal roles.\textsuperscript{33}

Thus, Fodor holds the identity relation between the neural events and states with the linguistic or cognitive states. Moreover, the propositional attitudes of the cognitive states are dependent upon the causal efficacy of the neural states and processes. Both Chomsky and Fodor strongly hold that language processing or the thought processing is a cognitive activity, but not a conscious activity. According to Gillett:

...the cognitive activity of human beings can be understood as a set of transitions between causally structured inner states as specified by formal syntax and semantics.\textsuperscript{34}

The process of symbolization through the language of thought is purely syntactical in nature. Representation, which is a part of human thought process, takes place in the language of thought. Fodor remarks:

...representation as discussed in cognitive science is an abstraction from structured patterns of activity in a holistic web of brain function. In this abstraction, we still identify the key elements of an item of conceptual information by focusing on the central aspects of the use of the sign for the concept.\textsuperscript{9}

Semantic representation takes consciousness as the fundamental principle for concept formation. Human beings are not only biological systems with certain dispositional features, but they are also higher order conscious beings. Searle argues in favor of semantic representation, which has a biological origin. He writes:

Apparently it is just a feet of biology that organisms that consciousness have, in general, much greater powers of discrimination than those that
do not. Plant tropisms, for example, which are light sensitive, are much less capable of making fine discriminations and much less flexible than, for example, the human visual system. The hypothesis that I am suggesting then is one of the evolutionary advantages conferred on us by consciousness in the much greater flexibility, sensitivity and creativity we derive from being consciousness.\textsuperscript{36}

We think, imagine and try to comprehend the reality and its nature with the capability of our creative thinking. And all these are understood with reference to the semanticity that is directed about the things in the world. Semantic realization is a linguistic realization because what we think is the language that we use. Linguistic activity is something specific to the human mental life in particular and human life in general. Thus, there is biological basis of our semantic system.

Mental representations are important for not only what they express, but also especially for what people can do with them. We can evaluate the computational capability of an approach to mental representation in terms of how it accounts for three important kinds of high-level thinking.\textsuperscript{17} The first is problem solving: A theory of mental representation should be able to explain how people can reason to accomplish their goals. There are at least three kinds of problem solving to be explained: Planning, decision-making, and explanation. Planning problems include how to get to the airport before the light leaves, and the sort of exercise students are commonly asked to do in the classroom. In decision-making, people faced with a number of different means for accomplishing their goals need to select the best one. Explanation problems require people to figure out why something happened. Every intelligent human being is capable of planning, decision-making and generating explanations. A cognitive theory must have sufficient computational power to offer possible explanations for how people solve these kinds of problems. The computational power of a system of representations and procedures is not just a matter of how much the system can compute; it must also take into account how efficient the computation is. When people solve a problem, they are usually able to learn from the experience, and thereby solve it much more easily than the next time. From experience, we can
learn how to solve problems. So a theory of mental representation must have sufficient computational power to explain how people learn.

In addition to problem solving and learning, a general cognitive theory must account for human language use. General principles of problem solving and learning might account for language use, but it is also possible that language is a unique cognitive capacity. At least three aspects of language need use to be explained: People’s ability to comprehend language, their ability to produce utterances, and children's universal ability to learn language.

In artificial intelligence, it is explained how people develop computational models in problem solving and other activities. Cognitive science aims at understanding human cognition; so it is crucial that a theory of mental representation not only has a lot of representational and computational power, but also it is concerned with how people think. Accordingly, the third criterion for evaluating a theory of mental representation is psychological plausibility, which requires accounting not just for the qualitative capacities of human, but also for the quantitative results of psychological experiments concerning these capacities. A cognitive theory must not show how a task is possible computationally, but also try to explain the particular ways that humans do it. Cognitive neuroscience has thereby become an important part of reflection on the operations of mind; so we should try to assess each approach to knowledge representation in terms of neurological plausibility, even though information about how the brain produces cognition is still limited.

The final criterion for evaluating theories of mental representation is practical applicability. Although the main goal of cognitive science is to understand the mind, such understanding can lead to many desirable practical results. For educational purposes, for example, cognitive science should be able to increase understanding of how students learn, and to suggest how to teach them better. Thus, cognitive science increases our understanding of the intelligent system including the human mind.
Researchers in psychology, artificial intelligence, neuroscience, linguistics, and philosophy have adopted very different methods for studying the mind, but ideally, these methods can come together on a common interpretation of how the mind works. A unified view of cognitive science comes from seeing various theoretical approaches, as all are concerned with the mental representations and the procedures that are similar to the representations and procedures familiar in computer programs.

The representational theory of consciousness is the view that consciousness reduces to mental representations. It is the view that phenomenal characters somehow reduce to representational properties. A state has a ‘phenomenal character’ just in case it is conscious. Two states have the same phenomenal character just in case what one is like to its subject is the same as what the other is like to its subject. A state has a representational property when, to put it intuitively, it has a meaning or somehow stands in some process for something else, such as an object or a proposition. Some mental states represent other mental states, as I can think about my thinking about Delhi. Here, the thought about Delhi is ‘first order: the thought about the thought is ‘higher order’. According to first-order representationalism, some representational states that do not concern other mental states like seeing a green tree are sufficient to give rise to phenomenal character by their nature. First-order representationalism identifies phenomenal characters with a pair of content and an attitude.

IV. Cognition and Consciousness

Cognitive science aims at the study and explanation of human cognitive capacities like perception, memory, reasoning, language use and so on. Cognition is essentially an internal mental process. There are two assumptions regarding the existence and nature of knowing things or minds. First, there is a natural domain corresponding to cognition, namely, minds or knowing things. Secondly, the cognitive states and processes of the mind are phenomenal in nature. That is, cognitive states and processes like perception, memory, reasoning etc., are conscious mental states and processes with their phenomenological properties. Cognitive science is always concerned with the phenomenon of consciousness.
The contents of our conscious experience are closely related to the contents of our
cognitive states. Whenever one has a green sensation, individuated phenomenally,
he/she has a corresponding green perception, individuated psychologically on the
other hand; cognitive activity can be centered on conscious experience.

The cognitive mental states and processes are conscious states and
processes. A scientific explanation of consciousness is possible only by attending
to the structures and processes that realise the mental properties. The cognitive
mental states and processes are realised as a matter of fact by the structure and
organization of the brain and nervous system. For the cognitive scientist,
cognition is essentially of the same kind of thing that computers do. Cognition is
information-processing in the sense that a computer is equipped to carry out.
There are distinctions between the hardware of a computing machine and its
software, that is, the material it is made from and the program it runs. The
program is held to be similar to cognition, while the brain furnishes the hardware
level. Thinking in the brain is like running compute programs. To understand this
concept, there are two basic notions - algorithm and symbol manipulation. An
algorithm is a mechanical procedure by which we can generate a solution to a
problem by taking steps according to rules. The procedure is mechanical in the
sense that a machine without understanding could do it. That is, we do not need to
know what addition is in order to perform an addition algorithm. An algorithm
says: Just do it - don't ask why it works. What the logic behind it is- just carry out
the procedure and find out the result. It can be applied mindlessly, without insight
and without comprehension of the end product. It is precisely this property of
algorithms that make them so suitable for machine implementation, since
machines have not the mental powers to grasp what they are designed to do.
Symbol manipulation occurs whenever a symbolic system is made subject to
processes that operate on the symbols that compose it. A program is an algorithm
for manipulating symbols. The mechanical procedure operates on symbols to
produce a certain outcome. A computer works on symbols to give results
according to mechanical rules. For cognitive science, mental processes are
programmes in the sense that they are symbol-manipulating algorithms. Here,
cognition is information processing.
A machine that simply follows an algorithm by definition does not need to understand what it is doing but why. Our mental processes are not blind and mindless, but those of an algorithmic machine are. The reason is that computers can do as much as they can do that it is possible to mimic aspects of human cognition without putting understanding into the machine. Thus, we can build machines that do what human minds do without having to put minds into them, which we have no idea how to do anyway. A program is a set of instructions for manipulating symbols, conceived as syntactic objects; it is indifferent to what these symbols mean. We operate with words and sentences because of what they mean. We, the human beings, are semantic systems, while a computer is a syntactical system. Speaking a language obviously involves the manipulation of symbols, but it is much more than that, whereas a program is nothing more than a method for generating symbols, irrespective of their meaning. Why do we understand and the computer do not? Because we are conscious beings, that's why we understand. It is a necessary condition of understanding symbols that one be conscious. To understand a symbol, one must be aware of its meaning. But the machine cannot be conscious.

Cognition, as we have already seen, is an internal mental process. Therefore, the cognitive mental states and processes are conscious states and processes. The most important of our cognitive processes is sense perception. Sensory perception can be seen as the continuation of physiological processes in the body, and in this sense, there is no radical difference between the physical and the mental processes. Hence, the entire cognitive process can be seen as a kind of mechanical process. Sense perception, according to Descartes, takes place in three levels such as the physiological processes, the sensations and the judgments consequent upon the sensations. At the first level of perception, external objects stimulate the sensory organs, and the impressions formed thereof reach the brain through the nerves. This immediately leads to the second level of sensory response produced in the mind as a result of its being united with the body. The second level consists of the perceptions of plain, pleasure, color, smell etc. The third level consists of the judgments about the objects in the external world.
For the cognitive scientists, cognition is a formal process in the sense that executing structures and processes is causally successful only because of their structural organization as well as the form of internal representations. Each cognitive act is a conscious act. The sensation is present only in particulars, which are confused. Hence, the clear and distinct universal concepts, which are to be applied to the particular in order that there be cognition of the external world, must be innate to the mind. Though these universal ideas exist as potentialities, and hence are unconscious, they are defined in relation to consciousness.

There are deep and fundamental ties between consciousness and cognition. The basic point of this relationship is phenomenal judgment. Phenomenal judgments are often reflected in claims about consciousness and they themselves are cognitive acts. To understand properly what are phenomenal judgments, David Chalmers divided it into the three parts. These are: first-order, second-order, and third order phenomenal judgments. First-order judgments are the judgments, which concern not the experience itself but the object of the experience. For example, when we have a red sensation looking at a red book, there is generally an explicit or implicit judgment. There is something red. According to Chalmers:

...when I have the experience of hearing a "musical note" there is an accompanying psychological state concerning that musical note. It seems fair to say that any object that is consciously experienced is also cognitively represented, although there is more to say about.\(^\text{40}\)

Therefore, alongside every conscious experience, there is a context-bearing cognitive state. This is called as first-order judgment. When we have experience of a red book, there is a corresponding first-order judgment about the red book. Second-order judgments are more straightforward judgments about conscious experiences. In general, it seems that, for any conscious experience, at least one has the capacity to judge that one is having that experience. The third-order judgments are those when we make judgments reflecting on the fact that we have conscious experiences. The three kinds of judgments are as follows:

First-order judgment: That is red
Second-order judgment: I am having a red sensation now
Third-order judgment: Sensations are mysterious\(^\text{41}\)
According to Chalmers, the most fundamental coherence principle between consciousness and cognition is the relationship between consciousness and first-order judgments. This relation is basically based on the relationship between consciousness and awareness. Awareness is a purely functional notion, but it is nevertheless intimately linked to conscious experience. In some cases, wherever we find consciousness, we find awareness. Wherever there is conscious experience, there is some corresponding information in the cognitive system that is available for verbal report.
Notes and References


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