Lecture 14

Functionalism

Overview

Functionalism may be defined as a theory that explains mental phenomena in terms of the external input and the observable output. It explains the mind as a complicated machine. In contemporary philosophy of mind, functionalism plays a vital role. Functionalism arose as a result of the meteoric rise of interest in computing machines and artificial intelligence. The functionalists say that mental processes are computational processes realized in a machine. The central idea that holds functionalism is the computational view of mind. In functionalism, the mind is a device capable of performing particular sorts of operation. A state of mind resembles a computational state and is at least, to some extent, sharable in principle by any number of material systems. If we understand computation at a fairly general level, we can see that the idea that mental processing is computation is a serious empirical hypothesis rather than a metaphor. Thus, to talk about minds and mental operations is to talk about machines and their states.

Keywords: Functionalism, Machine States, Behavioral, Mind, and Mental States

Functionalism

Functionalism arose as a result of the phenomenal rise of interest in computing machines and artificial intelligence. The functionalists say that mental processes are computational processes realized in a machine. Functionalism is a theory that explains mental phenomena in terms of the external input and the observable output. It explains the mind as a machine. It takes mental states as the internal causes of behaviour. Against dualism, the functionalist holds that the mind is not something that exists apart from the physical. Against materialism, the functionalist denies that mental states are identical with physical states. For functionalism, it is not the physical substance itself that is important, but rather the way in which the physical substance is organized. It admits a network of interrelated mental states and processes, which explains that the mind as a complicated system of processes can be realized in a machine. H. Putnam characterizes
functionalism as a model of mind, according to which, psychological states are simply computational states of the brain. Functionalism holds, according to him, “the proper way to think of the brain is as a digital computer. Our psychology is to be described as the software of this computer—its ‘functional organization.’”¹

The main concern of functionalism is to specify the relations between the different sorts of thought and behaviour. It is the view that mental states are definable in terms of their causal relations to sensory inputs, behavioural outputs, and other mental states. It acknowledges the fact that it is impossible to identify mental state with behavioural dispositions, but it characterizes mental states by reference to behaviour as the output. By characterizing mental states in terms of their causal roles, functionalism explains how a subject behaves in different circumstances. For example, when we experience pain, our experience has a characteristic ‘feel’. Thus, we have a conscious experience, an experience with certain qualities or qualia. But for functionalist, these qualities are a particular kind of causal role in our psychological process.

According to functionalism, there are three different kinds of causal relationship for mental state’s causal role. First, there is the input condition that a subject’s environment states can cause that subject to have a certain type of mental states. For example, injury to one’s leg causes him/her to feel pain. Secondly, there is the output condition that a certain type of mental state can interact causally with other mental states of the same subject, e.g. feeling pain in his/her leg causes him/her to believe that the leg has been injured. Thirdly, there is the internal role condition that there are characteristic ways in which a certain type of mental state can give rise causally to the bodily behaviour of its subject. For example, the subject believes that his/her leg has been injured and he/she has a desire to relieve the consequent pain and cause the leg to withdraw from harm’s way. Thus, there is an input-output relation between the environment, the mind and the behaviour of the subject.

For functionalism, mental states are characterized as ‘software’ states of a computer like in terms of their relations to the computer’s ‘inputs’ and ‘outputs.’ P.M. Churchland discusses that

The term ‘hardware’ refers to the physical computer itself and its peripheral devices, such as the keyboard for input, video screens and printers for outputs, and external or ‘passive’ memory tapes/disks/drums for both. It contrasts with the term ‘software’, which denotes a sequence of instructions that tell the hardware what to do.\(^2\)

Thus, ‘software’ state of a computer means it is storing of a particular piece of information, which is like a subject’s possession of a certain belief. A software state may be contrasted with a ‘hardware’ state of the computer, such as an electromagnetic state of certain of its circuits, which correspondingly is likened to a neural state of a person’s brain. For example, the computer’s ‘inputs’ are keystrokes on its keyboard, whereas its ‘outputs’ are patterns displayed on its video screen. These are likened to stimulations of a subject’s sensory organs and movements of his or her body. According to this view, the biological function of the heart is to circulate blood through the body and thereby keeping the body oxygenated and nourished. The biological function of the brain is to gather information from the body’s environment and process that information in accordance with certain ‘programs’ that have been ‘installed’ in it either by genetic evolution or else through learning processes.

Functionalism describes this type of relations of mental states without any “mysterious mental entities” which is called a Ramsey Sentence. For example, suppose John has the belief that \(p\), and that this is caused by his perception that \(p\); and together with his desire that \(q\), the belief that \(p\) causes his action \(a\). Here, we are defining beliefs in terms of their causal relations. We can eliminate the explicit use of the word ‘belief’ and simply say that there is something that stands in such-and-such causal relations. Through the Ramsey Sentence, functionalism shows that there is nothing especially mental about mental states. That means, any system, whatever it is, can have mental states, provided that it has the causal relations between its inputs (its inner

functioning) and its outputs. Searle remarks, “It just treats the mind as a kind of a black box in which these various causal relations occur, and for that reason it was sometimes labeled “black box functionalism.”

For a functionalist, the same mental state can be physically realized in a variety of different ways, and so, it is ‘multiply realizable.’ There can be indefinitely many different physical properties, which are total realizations of the same functional property. According to Shoemaker:

... while having a given total realization of a functional property is sufficient for having that property, it is not necessary for it—that same functional property could be instantiated in virtue of the instantiation of some quite different total realization of it.

However, Block and Fodor have argued that the same physical state can realize different functional properties at different times, or in different circumstances, or in different creatures.

According to functionalism, mental states and processes are functional kinds. It accepts physicalism and claims that our mental states are implemented in a neural stuff and not in a spiritual stuff. So on the level of description, there is the causal and logical relations among perceptions, beliefs, desires, and behaviours, and on the structural level, there are spiking frequencies of neurons, patterns of excitations, etc. According to P. Churchland, “In our case the

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functional organization that is our psychology is realized in our neural ‘gubbins.’ In similar fashion, it is because on-off switches in a computer are orchestrated as they are that it adds, finds square roots, and so forth. The computer’s program is realized in its electronic ‘gubbins.”

The multiple-draft-model given by Dennett suggests similarity between the functions of the human mind and those of the computer. The brain system functions in relation to different sub-systems. So there are multiple drafts, which operate within an artificial system. Such an analogy is beneficial because it analyses consciousness from the point of view of language processing. This is given importance precisely in the sense that a linguistic or language speaking being is considered not only as a conscious being but also a rational being. Even the robots as information processing systems can also be characterized as intelligent systems. According Dennett, “of course, we are machines, we are just very, very sophisticated machines made of organized molecules instead of metal and silicon, and we are conscious, so there can be conscious machines – us.” So the human thought process and language processing in the artificial systems are analogous to each other. In the case of the conscious thought process, we are aware of our thoughts, at the same time, there is physico-chemical process, which goes on in our brain.

Dennett’s functional analysis of consciousness is divided into two parts; namely the sub-personal view of consciousness and the multiple draft-model of consciousness. The sub-personal model explains consciousness and other mental activities through the help of neurological states

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and processes of the organism, whereas the multiple-draft-model discusses how an artificial system behaves intelligently. Dennett offers a functional explanation of consciousness at the sub-personal level. As Dennett writes, “Sub-personal theories proceed by analyzing a person into an organization of subsystems (organs, routines, nerves, faculties, components—even atoms) and attempting to explain the behaviour of the whole person as the outcome of the interaction of these subsystems. Thus in the present instance the short coming emerged because the two access notions introduced computational access simpliciter and the computational access of a print-out faculty, were defined at the sub-personal level; if introduced into a psychological theory they would characterize relations not between a person and a body, or a person and a state of affairs or a person and anything at all, but rather, at best relations between parts of person (or there bodies) and other things.”

The sub-personal level of explanation of consciousness tries to explain not how the human beings are system of organism but how the system is being constituted and how the various functions involved in different physiological parts of the organism function together. And that functional structure would help us in defining the capacity involved in causing consciousness or what we call conscious behaviour. A state of consciousness is simply, one which exhibits a certain characteristic pattern of causal relations to other states, both mental and physical.

For the cognitive theorists, a functional state of the brain is just like a computational state of a computer. It seems we have a perfect model of functional organization in a computer program. A computer program can be described as being a functional organization of the hardware i.e., the programmer provides the organization of the hardware, which causes it to produce a desired result. Nowadays functionalists argue that mental states are like the “information – processing” states of a computer. According to the computer functionalism, which is artificial intelligence or strong AI, the brain is a computer, and the mind is a computer.

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program implemented in the brain. Mental states are just program states of the brain. However, the functionalists face a problem regarding consciousness. They seem to think that our conscious feeling of pain consists entirely in the functionally analyzed program states of a digital computer in our skull. Thus, when it comes to conscious feelings such as pain, there is a difference between functionalists and others. According to our ordinary common-sense conception, pains are unpleasant sensations. That is, they are unpleasant, inner, qualitative, subjective experiences. Whereas the functionalists believe that pains are physical states that are parts of patterns of functional organization in brains. In human beings the functional organization is like this: certain input stimuli such as injuries cause physical states of the nervous system, and these in turn cause certain sorts of physical output behaviour, (these are computational, information processing states). In humans, these functionally organized physical states don’t cause pains, they are just pains.

A functionalist defines any mental state in terms of its typical relations to other mental states and its effects on behaviour. Functionalism can be more easily understood through a comparison with the relationship between a computer and its program. While talking about computers it is convenient to make a distinction between hardware and software. The hardware of a computer is what it is physically made up of—transistors, circuits, silicon chips, screen, keyboard and so on. The software, on the other hand, is the program, the system of operations, which the hardware carries out. The software can usually be adopted for use in a number of different systems. The software is usually a complicated system of instructions to the computer hardware, which can be physically carried out in a number of different ways, but achieving the same result.

Functionalism as a theory of mind is concerned with the software of thought rather than the hardware. It is not a theory about the hardware of thought at all, although it is certainly compatible with various kinds of physicalism: it is neutral about what sorts of physical systems mental programs operate in. Its main concern is to specify the relations, which are held between the different sorts of thought and behaviour. However, functionalism does not give an adequate
account of conscious experience and sensations such as what it is like to be in pain, to be happy, to be thinking about the weather and so on because of its commitment to physicalism.

The Different Kinds of Functionalism

We have already discussed about functionalism, which states that 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. 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. 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
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”, 10 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 hydrolic 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.” 11 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

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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 property in an invertebrate. For the functionalist, if someone has now a particular pain, then he/she 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 it’s 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.

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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.¹³

H.Putnam¹⁴ 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.”

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.\(^{16}\)

\(^{16}\) Ibid., p.74-75.
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.”17

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

17 Ibid., p. 83-84.
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 states 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.