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Mind: A Connectionist Model

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ABSTRACT

In cognitive science, there are many computational theories regarding the functions of the mind; connectionism is one of them. Connectionist networks are intricate systems of simple units related to their environments. Some have thousands of units, but those with only a few units can also behave with surprising complexity and subtlety. This is because processing occurs in parallel as also interactively, in marked contrast with the serial processing to which this is accustomed. In the first section of this paper, I intend to describe a simple network that illustrates several features of connectionist processing. Secondly, I would like to examine its relation with other areas in the realm of cognitive science. Thirdly, I shall make an attempt to find out whether this theory contributes to the replacement of folk psychology. Lastly, I find that connectionist thus fails to account for the real nature of the mental states because of its not too clear attempt to reduce mental states to the machine states. The mechanistic theory of mind in all its hues faces the question as to how we can account for the qualitative content of our consciousness. It cannot ultimately tell us how the subjective experience is possible and how consciousness can be real in the universe. The mechanistic view does not have any convincing answer to the question as to how are qualia a necessary feature of consciousness. If the mind functions like a machine, it can best exhibit only mechanical states which look very much like the mental states but, analogically, are very different from the machines.

There are different models of mind: Connectionism is one of them. In modern cognitive science, these models have provided the basis for simulating or modelling cognitive performance. Simulation is one of the important ways of testing theories of the mind. If a simulation performs in a manner comparable to the mind, then it will offer support for the theory underlying that simulation.

However, in cognitive science, two models have provided the basis for most of the simulation activity.[1] On the one hand, a digital computer can be used to manipulate symbols. In so far as it becomes possible to program the symbol-processing computer to execute tasks that seem to require intelligence, the symbol-processing computer becomes a plausible analogy to the mind. Numerous cognitive science theorists have been attracted to the proposal that the mind itself is a symbol-processing device.

The model of the brain, on the other hand, is a technique for analyzing the anatomy and physiology of the brain. This view suggests that the brain consists of a network of simple electrical processing units, which simulate and inhibit one another. The style of explanation of the brain, in the cognitive science, is generally considered as the brain-style computation.

Now, the question is: Why should there be a brain-style computation? The basic assumption is that we seek an explanation at the program or functional level rather than the implementational level. Thus, it is often pointed out that we can learn very little about what kind of program a particular computer may be running by looking at the electronics with which it is made. In fact, we do not care much about the details of the computer at all: All we care about is the particular program that is running. If we know the program, we will know how the system will behave in any situation. It does not matter whether we use vacuum tubes or transistors: the essential characteristics are the same. It is true for computers because they are all essentially the same. Whether we make them out of vacuum tubes or transistors, we invariably use computers of the same design. But when we look at essentially a difficult architecture, we see that the architecture makes a good deal of difference. It is the architecture that determines which kinds of algorithms are most easily carried out on the machine in question. It is the architecture of the machines that determines the essential nature of the program itself.[2] Thus, it is reasonable that we should begin by asking what we know about the architecture of the brain and how it might shape the algorithms underlying the biological intelligence and human mental life.

Rumelhart[3] says that the basic strategy of the connectionist approach is to take the neuron as its fundamental processing unit. We imagine that computation is carried out through simple interactions among such processing units. Essentially, the idea is that these processing elements communicate by sending numbers along the lines that connect the processing elements. This identification already provides some interesting constraints on the kinds of algorithms that might underlie human intelligence. A question may arise here: How does the replacement of the computer metaphor as model of mind affect our thinking? Rumelhart[4] says that this change in orientation leads us to a number of considerations that further inform and constrain our model-building effort. This is so, because neurons are remarkably relative to the components in modern computers. Neurons operate in the time scale of milliseconds, whereas computer components operate in the time scale of nanoseconds—a vector of 10^6 time faster.[5] This means that the human brain process that receives the order in a second or less can involve only a hundred or so times steps. Because, most of the computational processes like perception, memory retrieval, etc., take about a second to function. That is, we seek explanations for these mental phenomena that do not require more than about a hundredth elementary sequential operations.

The human brain contains billions of such processing elements. Just as the computer organizes computation with many serial steps, similarly the brain can deploy many processing elements cooperatively and in parallel to carry out its activities. Thus, the use of the brain-style-computational system offers not only a hope that we can characterize how brains actually carry out certain information processing tasks but also offers solution to computational problems that seem difficult to solve in a more traditional computational framework.

The connectionist systems are capable of exploiting and mimicking a brain-style computation such as artificial intelligence. Connectionism operates both as a system and a process. The connectionist systems are very important because they provide good solutions to a number of difficult computational problems that seem to often arise in models of cognition. The connectionist model can solve best-mach-search, rapid-pattern-matching, implementing content-addressable memory-storage systems. This model allows many more such systems to its environment. Connectionism as a processing mechanism is carried out by a number of processing elements. These elements, called nodes or units, have a dynamics, which is roughly an analogue to simple neurons. Each node receives input from some number of the nodes and responds to that input according to a simple activation function, and in turn excites or inhibits other nodes to which it is connected.[6]

The above analogy will be very clear, if we go through the connectionist system.

THE CONNECTIONIST FRAMEWORK

Figure 1 is arbitrarily taken as a connectionist model. In any connectionist model, there are three units such as input units, hidden units, and output units. Here, the input units are 'I', 'S', ..., 'N', 'R', the hidden units are 'IS', 'THE', 'MAT', 'ON', 'RAT', and the output unit is 'THE RAT IS ON THE MAT.' There may be many inputs, hidden units, and many output units. The hidden units serve neither as input nor output units, but facilitate the processing of information through the system. This model will be very clear if we go through Rumelhart's[7] seven major components of any connectionist model.

(i) A Set of Processing Units

Any connectionist system begins with a set of processing units. All the processing of the connectionist system is carried out by these units. There is no executive or other agency. There are only relatively simple units, each doing its own relatively simple job. A unit's job is simply to receive input from its neighbours and, as its function, it sends output values to its neighbours. The system is inherently parallel in the sense that many units can carry out their computations at the same time.

There are three types of units—input, output, and hidden units. Input units receive input from sources external to the system under study. The output units send signals out of the system. The hidden units are

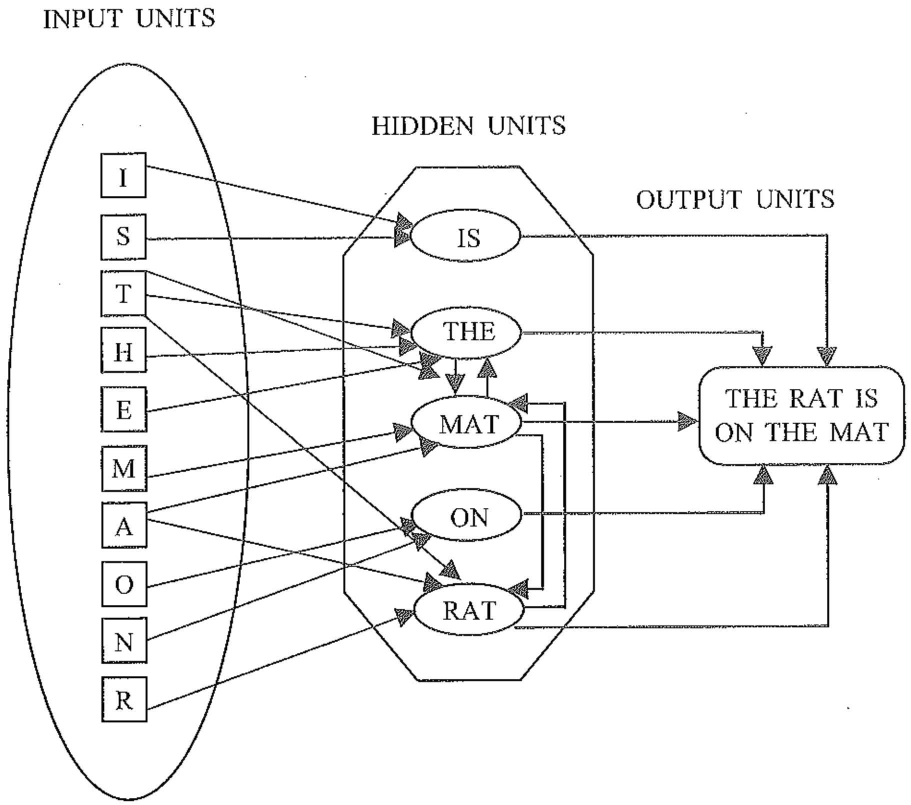

Figure 1: A connectionist model.

those that check that inputs and outputs are from within the system they are modelling. They are not visible to any outside system.

(ii) The State of Activation

In addition to the set of units, we also need a representation of the state of the system at time 'T'. This is primarily specified by a vector (T), representing the pattern of activation over the set of processing units. Each element of the vector stands for the elements of one of the units. It is the pattern of activation over the set of units that captures what the system represents at any time. It is useful to see processing in the system as the evolution, through time, of a pattern of activity over the set of units.

(iii) Output of the Units

Units interact by transmitting signals to their neighbours. The strength of their signals and the degree to which they affect their neighbours are determined by their degree of activation. But in some of our models, the output level is exactly equal to the activation levels of the unit. The output of the unit depends on its activation values.

(iv) The Pattern of Connectivity

Units are connected to one another. It is this pattern of connectivity that constitutes what the system knows and determines how it will respond to any arbitrary input. Specifying the processing system and the knowledge encoded therein is a matter of specifying this pattern of connectivity among the processing units.

(v) Activation Rules

We also need a set of rules whereby the inputs impinging on a particular unit are combined with one another and the undergoing processing, with the current states of unit, produces a new state of activation.

(vi) Modifying Pattern of Connectivity as a Foundation of Experience

Changing the processing or knowledge structure in a connectionist system involves modifying the pattern of interconnectivity. Generally, there are three kinds of modifications:

(a) Development of new connections.
(b) Loss of existing connections.
(c) Modification of the strength of connection that already exists.

(vii) Representation of the Environment

For the development of any model, it is very difficult to have a clear representation of the environment in which this model is to exist. In the connectionist model, we represent the environment as a time-making stochastic function over the space of input patterns. That is, we imagine that at any point of time, there is some probability that any of the possible sets of input patterns is impinging on the input units. This probability depends on the history of inputs as well as outputs of the system. In practice, most models involve a much simpler characterization of the environment.

CONNECTIONISM AND ITS RELATION WITH OTHER DISCIPLINE

Now the question is: What is the relation of connectionism with other disciplines like artificial intelligence and philosophy of mind? Cognitive science is an interdisciplinary research area which has emerged from the cognitive revolution. Cognitive science includes artificial intelligence, cognitive psychology, linguistics, neuroscience and philosophy. It reveals functional unity among diverse epistemological assumptions because they share certain core assumptions of the symbolic approach to cognition. In contrast, connectionism is related to all these areas, being a part of neuroscience which talks about cognition in a different manner. This is said to be done by locating the neurons in the cerebral cortex that correlate best with consciousness and then figuring out how they link to the neurons elsewhere in the brain, as the connectionist explains. This theory was first outlined by Crick and Koch.[8] They hypothesized that these oscillation are the basis of consciousness. This is partly because the oscillations seem to be correlated with awareness in different modalities within the visual and olfactory systems and also because they suggest a mechanism by which the binding of information contents might be achieved. Binding is the process whereby separately represented pieces of information about a single entity are brought together to be used by later processing, as when information about the colour and shape of a perceived objected is integrated from separate visual pathways. Both connectionists and neuroscientists are exploring the consciousness or mind broadly from a materialistic point of view. They leave out the essence of mind, and forget about the really difficult aspects. Now, we may raise some of the questions like, why does it exist? What does it do? How could it possibly arise from pulpy gray matter? How can an unintelligent machine give rise to an intelligent experience? If the cognitive scientists try to give an answer, then that answer will not be appropriate for the relevant questions. But it is very difficult to offer precise definitions of mind.

CONNECTIONISM AND ARTIFICIAL INTELLIGENCE

Artificial intelligence has witnessed the emergence of several new methods of analysis, including connectionism that investigates the properties of networks of neurons, like units. This approach focuses on computational methods inspired by natural phenomena. Connectionism is inspired by observations of basic neural activity in biological organisms. Connectionism is an approach to cognitive modelling which, in contemporary usage, refers to particular classes of computer-implemented models of artificial intelligence. Artificial intelligence gives importance to the mind, whereas connectionism emphasizes on the brain. For connectionism, human brain is a neural network; that is to say, that there is a relation among the neurons. Artificial intelligence argues that the mind is the software, and the brain is the hardware in which the mind works. This is also the view of functionalism. Thus, both connectionism and artificial intelligence belong to the same theory concerned about the human mind.

PHILOSOPHICAL IMPLICATION OF CONNECTIONISM

In the understanding of cognition, connectionism will necessarily have implications of philosophy of mind. There are two areas in particular on which it is likely to have an impact. They are the analysis of the mind as a representational system and the analysis of intentational representational.

Fodor distinguishes the computational theory of mind from the representational theory of mind. The representational theory of mind holds the view that systems have mental states by virtue of encoding representations and standing in particular relations to them. The computational theory adds that cognitive activity consists of formal operations performed on these representations.[9]

Fodor and Pylyshyn's argument against connectionism brings out the defects of the connectionist model. They opine that it fails to support the computational theory.[10] Fodor interprets connectionist models as representational and, thus, potentially conforming to the representational theory of mind. This is because connectionists routinely interpret the activations of units or groups of units as representing contents.. This is the case for input and output units providing cognitive interpretation of a network's activity; thus, a theorist must treat the input as a representation of a problem and the output as representing the answer. Some times this is done unit by unit. A given unit is found

to be activated by inputs with certain features and then interpreted as representing those features. This is interpreted as that the network has differentiated inputs with differentiated features. This further suggests that connectionist systems can indeed be understood as the representation theory of mind. Even if connectionist networks exemplify the representational theory of mind, they are significantly different from more traditional examples of the representational theory.

Firstly, it is not clear that we can always interpret what units in a connectionist network can be represented in natural language terms.

Secondly, the representations constructed are not discrete but distributed. That is, the same units and the same connections connect many different representational roles rather than employing one representation per role. This distinguishes the connectionists' representations from those that have been previously designed.

Thirdly, it is emphasized that the pattern of activations on hidden units in connectionist systems are the products of the learning that the system has undergone. The interpretations assigned to these units are not arbitrary. They are represented symbolically, but are analysis of how the network has solved the problem it was confronting. Thus, the network is connected to real sensory inputs, and not supplied inputs by the modeller machinery. The intentionality of these representations is genuine, not merely a product of the theorist's interpretation.

WHETHER CONNECTIONISM CONTRIBUTES TO THE REPLACEMENT OF FOLK-PSYCHOLOGY

We know that in many ways, cognitive science orginated from philosophy. The importance of connectionism to philosophy emerges first with respect to the question of whether folk-psychology remains viable or it must be replaced. If it is replaced, then the reliance on prepositional representations of knowledge in other areas of philosophy would be at risk. Because connectionism explains the mind in terms of mechanical processes, it omits the 'mentality' of the human mind. This theory suggests that there is no mental quality such as belief, intention, etc. If connectionism should provide a correct account of mental processing, and if it did not turn out to implement symbolic systems, then the account of mental life as actually involving the manipulation of propositions would appear to be false. That is, mental states involving propositions will not figure in the causal genesis of behaviour.

William Bechtel and Adele Abrahamsen quote from William Churchland regarding eliminative materialism by maintaining that if a theory fails to reduce to our best scientific theories at lower levels, it must be dismissed as false. They contend that reduction fails in the case of folk psychology because there is nothing in the head with which to identify the propositions it posits. This conclusion entails the further conclusion that folk psychology is false.[11] In making this inference, they assume that folk-psychological theories about processes occur inside people's mind. Now, we have to examine the question whether connectionism contributes to the replacement of folk psychology.

According to William Bechtel and Adele Abrahamsen,[12] folk psychology refers to people's attributions of prepositional attributes to other people and uses the same to predict and explain their behaviour. These attributions are made to entire persons; folk psychology does not itself offer an account of the finer-gained internal operations that may produce prepositional attitudes. If we attribute to a person a particular belief that itself need not be a discrete internal state, the states inside the person that enable the person to have a belief will have a quite different character.

Bechtel and Abrahamsen apply the above point to the case of cognition. The activities inside the head may enable a person to have beliefs and desires, but it does not assume that they have internal states that correspond to these prepositional attributes. It may be that the internal activities are best described in the connectionist approach. However, it does not prove that folk psychology is false. But if it is false, it will be so because it does not give a correct characterization of the cognitive state of persons and must, therefore, be replaced by a better theory at the same level.

Here, I would like to argue that the connectionists' model of mind is unable to refute folk psychology. The connectionists explain the mind in syntactical terms and thereby neglect semantics, which is very important to understand the human mind. There is mental content which represents the world; that is to say, there is central 'agency' or the 'I' to which the mental activity is ascribed. This shows that the human mind has propositional attitudes about the world. As David Chalmers pointed out, mental states such as 'belief', 'doubt', etc.—often called 'propositional attitudes'—are attitudes to propositions concerning the world.[13] For example, when I believe that John will tour India, I endorse a certain propositions concerning John; when I hope that John will tour India, I have different attitudes toward the same proposition. Here, the central feature of these mental states is their semantic aspect, or intentionality. That is, a belief has semantic content; the content of my belief cited is something like the proposition that John will tour India. This semantic or intentionality aspect has features of subjectivity and qualia. The subjectivity of consciousness is an essential feature of mental states, which can prove that the ontology of mental states is an irreducible fact of first-person ontology. In contrast, in the case of connectionists' model of the mind, there is no subjective experience, and it gives the explanations of mind in the third-person perspective.

Now the question is: Can subjective experience be made a part of the objective structure of the natural order in the way the connectionist functions of the mind are? This has generated a debate as to whether there can be a complete reduction of the subjective experience into mechanical states of the brain. William Bechtel, Rumelhart, and Marr are fully committed to the replacement of folk psychology. However, this can be opposed on the grounds that the mental beliefs are ascribed to a conscious subject and not to the connectionist model of mind or brain because the brain is at best a physical system, though with infinite physical capacity. The subject is non-reducible to the brain in the sense that the brain itself belongs to the subject. The subject functions autonomously; the qualia as well as the brain states are merely different states of the autonomous subject.[14] Thus, the reality of the subject of the qualia has to be admitted if we can have coherent theory of mind.

The connectionist model of the mind fails to account for the real nature of the mental states because of its not too clear attempt to reduce mental states to the machine theory states. The connectionist theory of the mind fails because of its reductionist dogma: It makes the mind superfluous in the universe.[15] The human mind is, at best, a mechanical system with certain determinate functions.

The mechanistic theory of the mind in all its hues faces the question as to how we can account for the qualitative content of our consciousness. It cannot ultimately tell us how the subjective experience is possible and how consciousness can be real in the universe. The mechanistic view does not have any convincing answer to the question as to how qualia are a necessary feature of consciousness. If the mind functions like a machine, it can at best exhibit only mechanical states which look quite like the mental states but ontologically are very different.

THE NOTION OF 'SUBJECTIVITY' AND THE CONCEPT OF 'I' OR 'AGENCY'

Consciousness is a specific feature of living organisms. Humans, as conscious beings, possess this specific feature. Each human being has a uniqueness of seeing or experiencing things, and it is important to understand the very nature of their subjective experiences.

Consciousness seems to involve something that is essentially subjective. In case of a conscious mind, there is a subjective point of view, which is accessible only to the conscious being itself. Consciousness is a phenomenon which cannot be measured, observed or experienced in public, because it is a personal matter. It can be known only from a first-person perspective, but not from the third-person objective or even scientific perspective. Thomas Nagel shows that subjectivity is a fundamental feature of consciousness. According to him, consciousness is what makes the mind-body problem intractable, as 'subjectivity' is its most troublesome feature. Self is the subjectivity, which encompasses our feelings, thinking, and perception. The qualitative character of experience is what it is like for its subject to have the experience. In his article, *What it is like to be a bat?* Nagel presents the notion of subjectivity, which proves the irreducibly subjective character of experience. He writes, 'Conscious experience is a widespread phenomenon. It occurs at many levels of animal life, though we cannot be sure of its presence in the simpler organisms, and it is very difficult to say in general what provides evidence of it ... no matter how the form may vary, the fact that an organism has conscious experience *at all* means, basically, that there is something it is like to *be* that organism ... But fundamentally an organism has conscious mental states if and

only if there is something it is like to *be* that organism—something it is like *for* the organism.'[16]

We can know the physical facts about a bat but we cannot know what it is to be like a bat. According to Nagel, we cannot comprehend a bat's experience; we cannot adopt its point of view. The subjective experiences of the bat are beyond our comprehension. The objective facts regarding the organism do not and cannot explain the subjective character of the bat's experiences. Scientific knowledge cannot answer to the question 'What is it like to be a bat?' Thus, Nagel sees the subjectivity of consciousness as a challenge to physicalism. He further argues that physical theories cannot explain one's phenomenal consciousness. Therefore, subjectivity is too difficult to be captured. According to him, subjectivity is, '... the subjective character of experience. It is not captured by any of the familiar, recently devised reductive analyses of the mental, for all of them are logically compatible with its absence. It is not analyzable in terms of any explanatory system of functional states, or intentional states, since they could be ascribed to robots or automata that behaved like people though they experienced nothing.'[17]

However, conscious experience is the representation of subjectivity. Facts about conscious experience, therefore, do not exist independently of a particular subject's point of view. Objective phenomena have a reality independent of appearances, but subjective phenomena are just phenomenological appearances. Nagel claims that science stands little chance of providing an adequate third-person account of consciousness, as there is no objective nature to phenomenal experience. Phenomenal experience cannot be observed from multiple points of view. As Nagel puts it, 'The reason is that every subjective phenomenon is essentially connected with a single point of view, and it seems inevitable that an objective, physical theory will abandon that point of view.'[18]

Hence, from the subjective point of view, we know what it is to be like us, but we do not know what it is to be like a bat. We do not know what it is like to have sonar experiences. Sonar experiences imply a subjective perspective and we must occupy that particular point of view in order to know specific sonar experiences. For example, we must be in the bat's position to know the bat's sonar experiences. Nagel writes, 'We may ascribe general *types* of experience on the basis of the animal's structure and behaviour. Thus, we describe bat sonar as a form of three-dimensional forward perception; we believe that bats feel some versions of pain, fear, hunger, lust, and that they have other, more familiar types of perception besides sonar. But we believe that these experiences also have in each case a specific subjective character, which is beyond our ability to conceive. And if there is conscious life elsewhere in the universe, it is likely that some of it will not describable even in the most general experiential terms available to us.'[19] In contrast to subjective experience, the subjective experience such as knowing the square root of 144 is 12 or table salt is a compound of sodium and chlorine does not require any kind of experience. This is not to deny that it may require some experience. It could be that any one who has this knowledge must also have the experience. However, what makes mathematical and scientific knowledge objective is not the particular kind of experience accompanying that knowledge. However, to know what it is like to see red entails having a particular kind of experience, which is the experience of seeing red. As Nagel puts it, 'In the case of experience, on the other hand, the connection with a particular point of view seems much closer. It is difficult to understand what could be meant by the *objective* character of an experience, apart from the particular point of view from which its subject apprehends it.'[20]

This subjective character of experience cannot be captured by any functional or causal analysis. Therefore, we do not know how physicalism can explain consciousness. Physicalism rules out the subjective viewpoint and, therefore, fails to explain human experiences. According to McGinn, consciousness is a natural process of the brain. However, we cannot form concepts of conscious properties unless we ourselves instantiate those properties because a blind man cannot understand the concept of a visual experience of red, like we cannot conceive of the echolocatory experiences of bats. We know that certain properties of the brain are necessarily closed to perception of the brain. Consciousness itself cannot be explained on the basis of what we observe about the brain and its physical effects. While rejecting physicalism, McGinn emphasizes that, 'Conscious states are simply not, *qua* conscious states, potential objects of perception; they depend upon the brain but they cannot be observed by directing the senses onto the brain. You cannot see a brain states *as* a conscious state.'[21]

Consciousness itself cannot be established simply on the basis of what we observe about the brain and its physical effects. Distinct cognitive properties, namely perception and introspection, necessarily mediate our relationships with the brain and with consciousness. We cannot understand how the subjective aspects of experience depend upon the brain; that is really the problem.[22]

According to William Lycan, in case of subjectivity, experiences are representations. For example, my visual experience of my blue shirt is a mental representation of the shirt as being blue. When I introspect my experience, I form a second-order representation of the first-order representation of the shirt. Other people have syntactically similar second-order representations. But each individual can introspect only his own experiences. For Lycan, this is the ultimate explanation of subjectivity. He analyses Nagel's view and replies that, 'seeing someone's brain in a state of sensing-blazing-red is nothing at all like sensing blazing red oneself'.[23] Similarly, in case of the bat's sonar sensation S; we do not have the sonar sensation S; we cannot ourselves feel S. We do not know what it is like to have S (we do not have cognitive access to S) in the way the bat does.[24]

For Lycan, these facts are obviously true and accepted even by materialists. When we observe the bat, at that time, we observe only some physical or functional state, but thereby we do not have that conscious state ourselves; we do not have the same perspective with respect to it. However, a materialist account of the mental should not claim otherwise. As he puts it, 'the felt incongruity is just what anyone, materialist or antimaterialist alike, should expect. Therefore, the incongruity affords no objection whatever to materialism, and to take it as impugning or even embarrassing materialism is simply fallacious.'[25]

From Nagel's point of view, the individual consciousness can be understood or reported only from the first-person perspective and not from the third-person objective viewpoint. An objective representation can be described in an objective manner. This representation or concept is a function from the world to the individuals. As Lycan says, '... any such function is objectively describable, or so it would seem ... there is nothing intrinsically perspectival about functions from worlds to individuals; any one could be described by anyone who had the right sort of mental apparatus or brain wiring.'[26]

However, Nagel's view is that the functional state of the bat having sonar sensation S is different from the bat's subjective consciousness. A functionalist takes it as an objective fact and tries to describe it as functions of the mind. However, an experience is held to be a conscious experience, which is likely for the subject of the experience to have it. Thus, we have to accept the qualitative feel of experience. This qualitative feel, unique to every distinguishable experience, is supposed to be what it is like for the subject of the experience to have the experience.

J. Searle argues that consciousness is subjective. Subjectivity is the most important feature of conscious mental states and processes, which is not possessed by other natural phenomena. Judgments are taken as 'subjective' when their truth or falsity is not a matter of fact or 'objective' criteria, but depends on certain attitudes and feelings of the maker of the judgment. For Searle, the term 'subjective' is an ontological category. The statement 'Someone is feeling pain in his/her leg' is completely objective, because it is true by the existence of a fact and is not dependent on the attitude or opinion of the observer. But the actual pain itself has a subjective mode of existence, which implies that consciousness is subjective. The term 'pain' is subjective as it is not equally accessible to any observer. Therefore, for Searle, every conscious state is always someone's conscious state.[27] Someone has a special relation to his/her own conscious states, which are not related with other people's conscious states. He says, 'Subjectivity has the further consequence that all of my conscious forms of intentionality that give me information about the world independent of myself are always from a special point of view. The world itself has no point of view, but my access to the world through my conscious states is always perspectival, always from my point of view.'[28]

According to Searle, a theory of consciousness needs to explain how a set of neurobiological processes can cause a system to be in a subjective state of sentience or awareness. We accept the view that subjectivity is a ground floor, irreducible phenomenon of natural science.

So, being objective cannot explain how this is possible. According to him, 'consciousness' stands for these subjective states of sentience or awareness that we possess when we are conscious, i.e. during the period we are not in a coma or are not unconscious.

Consciousness is, as Searle believes, essentially a subjective, qualitative phenomenon. It is not a mechanical state or a certain kind of set of dispositions to behaviour or a computer program, as many philosophers believe. There are two most common mistakes about consciousness such as that it can be analyzed behaviouristically or computationally. The Turing test shows that conscious mental states are mechanical or computational. It gives us the view that for a system to be conscious, it is both necessary and sufficient to have the right computer program or set of programs with the right inputs and outputs. There is no logical connection between the inner, subjective, qualitative mental states and the external, publicly observable output. Our mental states cannot be fully represented in a machine or in a computer. Because, somehow, we have subjective mental phenomena, which require a first-person perspective for proper understanding.

Searle describes 'subjectivity' as a rock-bottom element of the world. The world that we know to exist consists of particles, which are organized into systems including the biological systems. Some of these biological systems are conscious and that consciousness is essentially subjective. This subjective consciousness occupies a special ontological position. It is too fundamental to be an object of perception. As Searle puts it, 'But when we visualize the world with this inner eye, we can't see consciousness. Indeed, it is the very subjectivity of consciousness that makes it invisible in the crucial way. If we try to draw a picture of someone else's consciousness, we just end up drawing the other person (perhaps with a balloon growing out of his or her head). If we try to draw our own consciousness, we end up drawing whatever it is that we are conscious of.'[29]

When we try to observe the consciousness of other persons, we observe their conscious behaviour, structure and the casual relation between these behaviours and not the subjectivity of the person. There is something called subject of experience, which is an inner state and which eludes our observation. Observation is impossible in case of subjectivity, as there is no distinction between observation and the thing observed, between perception and the object perceived.[30] Therefore, though we can easily observe another person, we cannot observe his/her subjectivity. Similarly, in our own case, we cannot observe our own subjectivity though we can be intuitively aware of it. It is my inner self which is ontologically identical with myself. All observation presupposes an observer who occupies a subjective point of view. The observer observes from a subjective point of view, and has a subjective feel about it.[31] Thus, phenomenal consciousness has distinctive subjective feels.

The subjective feeling or experience is a mental state. What we feel is not such that each part of our body feels it. It is 'I', who is an agent that feels such emotions. The 'I' is the central problem of consciousness. Neurosciences try to explain how conscious experience arises from the electrochemical processes of the brain. Even if they can prove conscious states to be caused by the neural states the brain, they cannot show how and why the conscious states belong to an 'I'. The 'I' is not a part of the brain. Consciousness, therefore, is not identical with the brain states, which cause it. The 'I' that has consciousness is not identical with the brain states either. The 'I' is distinct from the body.

An individual's desires, beliefs, and intentions are formed according to one's interaction with the world. There is a qualitative difference between the mental states of one person from others. This qualitative feature of one's mental states is, therefore, treated as the subjectivity of consciousness. Qualia are a part of subjective experience realized in the brain. Conscious experience involves neural activity and information processing. Thus, consciousness is defined in terms of the qualitative feel of experience. This qualitative feel is supposed to be for the subject of the experience. If the mental world is irreducible and we have a reasonable assurance that the mind, at any cost stands, beyond the horizon of the physical world, we can make a safe bet that the mind has a reality of its own and that physicalism, connectionism and identity theories of all sorts fail to understand the inner dynamics of the mind.[32]

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NOTES AND REFERENCES

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