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Minds, Brains, and Computers: The Foundations of Cognitive Science An Anthology

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Place, "Is Consciousness a
Brain Process?"

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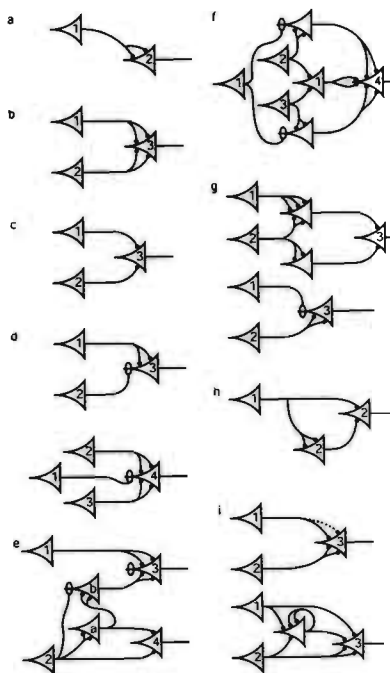


Figure 21.1 In the figure the neuron c_i is always marked with the numeral i upon the body of the cell, and the corresponding action is denoted by ' N ' with i as subscript, as in the text.

Figure 21.1a $N_2(t) \equiv .N_1(t-1)$

Figure 21.1b $N_3(t) \equiv .N_1(t-1)v.N_2(t-1)$

Figure 21.1c $N_3(t) \equiv .N_1(t-1).N_2(t-1)$

Figure 21.1d $N_3(t) \equiv .N_1(t-1) \sim .N_2(t-1)$

Figure 21.1e $N_3(t) \equiv :N_1(t-1) \sim .N_2(t-3) \sim .N_2(t-2) \sim .N_2(t-1)$

Figure 21.1f $N_4(t) \equiv \sim .N_1(t-1).N_2(t-1) \sim .N_3(t-1).v.N_1(t-1)$

$N_4(t) \equiv \sim .N_1(t-2).N_2(t-2) \sim .N_2(t-2).N_3(t-2)$

$N_4(t) \equiv \sim .N_1(t-2).v.N_1(t-2) \sim .N_2(t-2).N_3(t-2)$

Figure 21.1g $N_3(t) \equiv .N_2(t-2) \sim .N_1(t-3)$

Figure 21.1h $N_2(t) \equiv .N_1(t-1).N_1(t-2)$

Figure 21.1i $N_3(t) \equiv :N_2(t-1).v.N_1(t-1) \sim .N_1(t-1).N_2(t-1)$

behavior to nervous nets is not unique, whereas, of imaginable nets, only one in fact exists, and may, at any moment, exhibit some unpredictable activity. Certainly for the psychiatrist it is more to the point that in such systems "Mind" no longer "goes more ghostly than a ghost." Instead, diseased mentality can be understood without loss of scope or rigor, in the scientific terms of neurophysiology. For neurology, the theory sharpens the distinction between nets necessary or merely sufficient for given activities, and so clarifies the relations of disturbed structure to disturbed function. In its own domain the difference between equivalent nets and nets equivalent in the narrow sense indicates the appropriate use and importance of temporal studies of nervous activity: and to mathematical biophysics the theory contributes a tool for rigorous symbolic treatment of known nets and an easy method of constructing hypothetical nets of required properties.

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Is Consciousness a Brain Process?

U. T. Place

The thesis that consciousness is a process in the brain is put forward as a reasonable scientific hypothesis, not to be dismissed on logical grounds alone. The conditions under which two sets of observations are treated as observations of the same process, rather than as observations of two independent correlated processes, are discussed. It is suggested that we can identify consciousness with a given pattern of brain activity, if we can explain the subject's introspective observations by reference to the brain processes with which they are correlated. It is argued that the problem of providing a physiological explanation of introspective observations is made to seem more difficult than it really is by the "phenomenological fallacy," the mistaken idea that descriptions of the appearances of things are descriptions of the actual state of affairs in a mysterious internal environment.

I Introduction

The view that there exists a separate class of events, mental events, which cannot be described in terms of the concepts employed by the physical sciences no longer commands the universal and unquestioning acceptance among philosophers and psychologists which it once did. Modern physicalism, however, unlike the materialism of the seventeenth and eighteenth centuries, is behavioristic. Consciousness on this view is either a special

type of behavior, "sampling" or "running-back-and-forth" behavior as Tolman (1932) has it, or a disposition to behave in a certain way, an itch, for example, being a temporary propensity to scratch. In the case of cognitive concepts like "knowing," "believing," "understanding," "remembering," and volitional concepts like "wanting" and "intending," there can be little doubt, I think, that an analysis in terms of dispositions to behave is fundamentally sound (Wittgenstein, 1953; Ryle, 1949). On the other hand, there would seem to be an intractable residue of concepts clustering around the notions of consciousness, experience, sensation, and mental imagery, where some sort of inner process story is unavoidable (Place, 1954). It is possible, of course, that a satisfactory behavioristic account of this conceptual residuum will ultimately be found. For our present purposes, however, I shall assume that this cannot be done and that statements about pains and twinges, about how things look, sound, and feel, about things dreamed of or pictured in the mind's eye, are statements referring to events and processes which are in some sense private or internal to the individual of whom they are predicated. The question I wish to raise is whether in making this assumption we are inevitably committed to a dualist position in which sensations and mental images form a separate category of processes over and above the physical and physiological processes with which they are known to be correlated. I shall argue that an acceptance of inner processes does not entail dualism and that the thesis that

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consciousness is a process in the brain cannot be dismissed on logical grounds.

II The "Is" of Definition and the "Is" of Composition

I want to stress from the outset that in defending the thesis that consciousness is a process in the brain, I am not trying to argue that when we describe our dreams, fantasies, and sensations we are talking about processes in our brains. That is, I am not claiming that statements about sensations and mental images are reducible to or analyzable into statements about brain processes, in the way in which "cognition statements" are analyzable into statements about behavior. To say that statements about consciousness are statements about brain processes is manifestly false. This is shown (a) by the fact that you can describe your sensations and mental imagery without knowing anything about your brain processes or even that such things exist, (b) by the fact that statements about one's consciousness and statements about one's brain processes are verified in entirely different ways, and (c) by the fact that there is nothing self-contradictory about the statement "X has a pain but there is nothing going on in his brain." What I do want to assert, however, is that the statement "Consciousness is a process in the brain," although not necessarily true, is not necessarily false. "Consciousness is a process in the brain" in my view is neither self-contradictory nor self-evident; it is a reasonable scientific hypothesis, in the way that the statement "Lightning is a motion of electric charges" is a reasonable scientific hypothesis.

The all but universally accepted view that an assertion of identity between consciousness and brain processes can be ruled out on logical grounds alone derives, I suspect, from a failure to distinguish between what we may call the "is" of definition and the "is" of composition. The distinction I have in mind here is the difference between the function of the word "is" in statements like "A square is an equilateral rectangle," "Red is a color," "To understand an instruction is to be able to act appropriately under the appropriate circumstances," and its function in statements like "His table is an old packing-case," "Her hat is a bundle of straw tied together with string," "A

cloud is a mass of water droplets or other particles in suspension." These two types of "is" statements have one thing in common. In both cases it makes sense to add the qualification "and nothing else." In this they differ from those statements in which the "is" is an "is" of predication; the statements "Toby is eighty years old and nothing else," "Her hat is red and nothing else," or "Giraffes are tall and nothing else," for example, are nonsense. This logical feature may be described by saying that in both cases both the grammatical subject and the grammatical predicate are expressions which provide an adequate characterization of the state of affairs to which they both refer.

In another respect, however, the two groups of statements are strikingly different. Statements like "A square is an equilateral rectangle" are necessary statements which are true by definition. Statements like "His table is an old packing-case," on the other hand, are contingent statements which have to be verified by observation. In the case of statements like "A square is an equilateral rectangle" or "Red is a color," there is a relationship between the meaning of the expression forming the grammatical subject, such that whenever the subject expression is applicable the predicate must also be applicable. If you can describe something as red then you must also be able to describe it as colored. In the case of statements like "His table is an old packing-case," on the other hand, there is no such relationship between the meanings of the expressions "his table" and "old packing-case"; it merely so happens that in this case both expressions are applicable to and at the same time provide an adequate characterization of the same object. Those who contend that the statement "Consciousness is a brain process" is logically untenable, base their claim, I suspect, on the mistaken assumption that if the meanings of two statements or expressions are quite unconnected, they cannot both provide an adequate characterization of the same object or state of affairs: if something is a state of consciousness, it cannot be a brain process, since there is nothing self-contradictory in supposing that someone feels a pain when there is nothing happening inside his skull. By the same token we might be led to conclude that a table cannot be an old packing-case, since there is nothing self-contradictory in supposing that someone has a table, but is not in possession of an old packing-case.

III The Logical Independence of Expressions and the Ontological Independence of Entities

There is, of course, an important difference between the table/packing-case and the consciousness/brain process case in that the statement "His table is an old packing-case" is a particular proposition which refers only to one particular case, whereas the statement "Consciousness is a process in the brain" is a general or universal proposition applying to all states of consciousness whatever. It is fairly clear, I think, that if we lived in a world in which all tables without exception were packing-case, the concepts of "table" and "packing-case" in our language would not have their present logically independent status. In such a world a table would be a species of packing-case in much the same way that red is a species of color. It seems to be a rule of language that whenever a given variety of object or state of affairs has two characteristics or sets of characteristics, one of which is unique to the variety of object or state of affairs in question, the expression used to refer to the characteristic or set of characteristics which defines the variety of object or state of affairs in question will always entail the expression used to refer to the other characteristic or set of characteristics. If this rule admitted of no exception it would follow that any expression which is logically independent of another expression which uniquely characterizes a given variety of object or state of affairs must refer to a characteristic or set of characteristics which is not normally or necessarily associated with the object or state of affairs in question. It is because this rule applies almost universally, I suggest, that we are normally justified in arguing from the logical independence of two expressions to the ontological independence of the states of affairs to which they refer. This would explain both the undoubted force of the argument that consciousness and brain processes must be independent entities because the expressions used to refer to them are logically independent and, in general, the curious phenomenon whereby questions about the furniture of the universe are often fought and not infrequently decided merely on a point of logic.

The argument from the logical independence of two expressions to the ontological independence of the entities to which they refer breaks down in the case of brain processes and consciousness, I believe, because this is one of a relatively small number of

cases where the rule stated above does not apply. These exceptions are to be found, I suggest, in those cases where the operations which have to be performed in order to verify the presence of the two sets of characteristics inhering in the object or state of affairs in question can seldom if ever be performed simultaneously. A good example here is the case of the cloud and the mass of droplets or other particles in suspension. A cloud is a large semi-transparent mass with a fleecy texture suspended in the atmosphere whose shape is subject to continual and kaleidoscopic change. When observed at close quarters, however, it is found to consist of a mass of tiny particles, usually water droplets, in continuous motion. On the basis of this second observation we conclude that a cloud is a mass of tiny particles and nothing else. But there is no logical connection in our language between a cloud and a mass of tiny particles; there is nothing self-contradictory in talking about a cloud which is not composed of tiny particles in suspension. There is no contradiction involved in supposing that clouds consist of a dense mass of fibrous tissue; indeed, such a consistency seems to be implied by many of the functions performed by clouds in fairy stories and mythology. It is clear from this that the terms "cloud" and "mass of tiny particles in suspension" mean quite different things. Yet we do not conclude from this that there must be two things, the mass of particles in suspension and the cloud. The reason for this, I suggest, is that although the characteristics of being a cloud and being a mass of tiny particles in suspension are invariably associated, we never make the observations necessary to verify the statement "That is a cloud" and those necessary to verify the statement "This is a mass of tiny particles in suspension" at one and the same time. We can observe the microstructure of a cloud only when we are enveloped by it, a condition which effectively prevents us from observing those characteristics which from a distance lead us to describe it as a cloud. Indeed, so disparate are these two experiences that we use different words to describe them. That which is a cloud when we observe it from a distance becomes a fog or mist when we are enveloped by it.

IV When Are Two Sets of Observations Observations of the Same Event?

The example of the cloud and the mass of tiny particles in suspension was chosen because it is one

of the few cases of a general proposition involving what I have called the "is" of composition which does not involve us in scientific technicalities. It is useful because it brings out the connection between the ordinary everyday cases of the "is" of composition like the table/packing-case example and the more technical cases like "Lightning is a motion of electric charges" where the analogy with the consciousness/brain process case is most marked. The limitation of the cloud/tiny particles in suspension case is that it does not bring out sufficiently clearly the crucial problems of how the identity of the states of affairs referred to by the two expressions is established. In the cloud case the fact that something is a cloud and the fact that something is a mass of tiny particles in suspension are both verified by the normal processes of visual observation. It is arguable, moreover, that the identity of the entities referred to by the two expressions is established by the continuity between the two sets of observations as the observer moves towards or away from the cloud. In the case of brain processes and consciousness there is no such continuity between the two sets of observations involved. A closer introspective scrutiny will never reveal the passage of nerve impulses over a thousand synapses in the way that a closer scrutiny of a cloud will reveal a mass of tiny particles in suspension. The operations required to verify statements about consciousness and statements about brain processes are fundamentally different.

To find a parallel for this feature we must examine other cases where an identity is asserted between something whose occurrence is verified by the ordinary processes of observation and something whose occurrence is established by special procedures. For this purpose I have chosen the case where we say that lightning is a motion of electric charges. As in the case of consciousness, however closely we scrutinize the lightning we shall never be able to observe the electric charges, and just as the operations for determining the nature of one's state of consciousness are radically different from those involved in determining the nature of one's brain processes, so the operations for determining the occurrence of lightning are radically different from those involved in determining the occurrence of a motion of electric charges. What is it, therefore, that leads us to say that the two sets of observations are observations of the same event? It cannot be merely the fact that the two sets of observations are systematically cor-

related such that whenever there is lightning there is always a motion of electric charges. There are innumerable cases of such correlations where we have no temptation to say that the two sets of observations are observations of the same event. There is a systematic correlation, for example, between the movement of the tides and the stages of the moon, but this does not lead us to say that records of tidal levels are records of the moon's stages or vice versa. We speak rather of a causal connection between two independent events or processes.

The answer here seems to be that we treat the two sets of observations as observations of the same event in those cases where the technical scientific observations set in the context of the appropriate body of scientific theory provide an immediate explanation of the observations made by the man in the street. Thus we conclude that lightning is nothing more than a motion of electric charges, because we know that a motion of electric charges through the atmosphere, such as occurs when lightning is reported, gives rise to the type of visual stimulation which would lead an observer to report a flash of lightning. In the moon/tide case, on the other hand, there is no such direct causal connection between the stages of the moon and the observations made by the man who measures the height of the tide. The causal connection is between the moon and the tides, not between the moon and the measurement of the tides.

V The Physiological Explanation of Introspection and the Phenomenological Fallacy

If this account is correct, it should follow that in order to establish the identity of consciousness and certain processes in the brain, it would be necessary to show that the introspective observations reported by the subject can be accounted for in terms of processes which are known to have occurred in his brain. In the light of this suggestion it is extremely interesting to find that when a physiologist, as distinct from a philosopher, finds it difficult to see how consciousness could be a process in the brain, what worries him is not any supposed self-contradiction involved in such an assumption, but the apparent impossibility of accounting for the reports given by the subject of his conscious processes in terms of the known properties of the central nervous system. Sir

Charles Sherrington has posed the problem as follows (1947: xx-xxi):

The chain of events stretching from the sun's radiation entering the eye to, on the one hand, the contraction of the pupillary muscles, and on the other, to the electrical disturbances in the brain-cortex are all straightforward steps in a sequence of physical "causation," such as, thanks to science, are intelligible. But in the second serial chain there follows on, or attends, the stage of brain-cortex reaction an event or set of events quite inexplicable to us, which both as to themselves and as to the causal tie between them and what preceded them science does not help us; a set of events seemingly incommensurable with any of the events leading up to it. The self "sees" the sun; it senses a two-dimensional disc of brightness, located in the "sky," this last a field of lesser brightness, and overhead shaped as a rather flattened dome, coping the self and a hundred other visual things as well. Of hint that this is within the head there is none. Vision is saturated with this strange property called "projection," the unargued inference that what it sees is at a "distance" from the seeing "self." Enough has been said to stress that in the sequence of events a step is reached where a physical situation in the brain leads to a psychical, which however contains no hint of the brain or any other bodily part. . . . The supposition has to be, it would seem, two continuous series of events, one physico-chemical, the other psychical, and at times interaction between them.

Just as the physiologist is not likely to be impressed by the philosopher's contention that there is some self-contradiction involved in supposing consciousness to be a brain process, so the philosopher is unlikely to be impressed by the considerations which lead Sherrington to conclude that there are two sets of events, one physico-chemical, the other psychical. Sherrington's argument, for all its emotional appeal, depends on a fairly simple logical mistake, which is unfortunately all too frequently made by psychologists and physiologists and not infrequently in the past by the philosophers themselves. This logical mistake, which I shall refer to as the "phenomenological fallacy," is the mistake of supposing that when the subject describes his experience, when he describes how things look, sound, smell, taste, or feel to him, he is describing the literal properties

of objects and events on a peculiar sort of internal cinema or television screen, usually referred to in the modern psychological literature as the "phenomenal field." If we assume, for example, that when a subject reports a green after-image he is asserting the occurrence inside himself of an object which is literally green, it is clear that we have on our hands an entity for which there is no place in the world of physics. In the case of the green after-image there is no green object in the subject's environment corresponding to the description that he gives. Nor is there anything green in his brain; certainly there is nothing which could have emerged when he reported the appearance of the green after-image. Brain processes are not the sort of things to which color concepts can be properly applied.

The phenomenological fallacy on which this argument is based depends on the mistaken assumption that because our ability to describe things in our environment depends on our consciousness of them, our descriptions of things are primarily descriptions of our conscious experience and only secondarily, indirectly, and inferentially descriptions of the objects and events in our environments. It is assumed that because we recognize things in our environment by their look, sound, smell, taste, and feel, we begin by describing their phenomenal properties, i.e. the properties of the looks, sounds, smells, tastes, and feels which they produce in us, and infer their real properties from their phenomenal properties. In fact, the reverse is the case. We begin by learning to recognize the real properties of things in our environment. We learn to recognize them, of course, by their look, sound, smell, taste, and feel; but this does not mean that we have to learn to describe the look, sound, smell, taste, and feel of things before we can describe the things themselves. Indeed, it is only after we have learned to describe the things in our environment that we learn to describe our consciousness of them. We describe our conscious experience not in terms of the mythological "phenomenal properties" which are supposed to inhere in the mythological "objects" in the mythological "phenomenal field," but by reference to the actual physical properties of the concrete physical objects, events, and processes which normally, though not perhaps in the present instance, give rise to the sort of conscious experience which we are trying to describe. In other words when we describe the after-image as green, we are not saying that there is something, the after-image, which is green; we

are saying that we are having the sort of experience which we normally have when, and which we have learned to describe as, looking at a green patch of light.

Once we rid ourselves of the phenomenological fallacy we realize that the problem of explaining introspective observations in terms of brain processes is far from insuperable. We realize that there is nothing that the introspecting subject says about his conscious experiences which is inconsistent with anything the physiologist might want to say about the brain processes which cause him to describe the environment and his consciousness of that environment in the way he does. When the subject describes his experience by saying that a light which is in fact stationary appears to move, all the physiologist or physiological psychologist has to do in order to explain the subject's introspective observations is to show that the brain

process which is causing the subject to describe his experience in this way is the sort of process which normally occurs when he is observing an actual moving object and which therefore normally causes him to report the movement of an object in his environment. Once the mechanism whereby the individual describes what is going on in his environment has been worked out, all that is required to explain the individual's capacity to make introspective observations is an explanation of his ability to discriminate between those cases where his normal habits of verbal descriptions are appropriate to the stimulus situation and those cases where they are not, and an explanation of how and why, in those cases where the appropriateness of his normal descriptive habits is in doubt, he learns to issue his ordinary descriptive protocols preceded by a qualificatory phrase like "it appears," "seems," "looks," "feels," etc.

Note

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