U.T. Place, The British Founder of Physicalism:
From Behaviourism to Connectionism

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Dualism recognized the existence of inner mental processes and states, but without any material or physical foundation. Behaviourism, on the contrary, even if it did not deny their existence, refused to attribute any explanatory role to inner states and processes. In the *British Journal of Psychology,* in 1956, Place published a paper *Is Consciousness a Brain Process?* There, he advocated a form of physicalism which steers a middle course between dualism and behaviourism. Mental processes were considered to be literally inside the body and identical with material/physical processes in the brain. It is well known that dualism was seriously undermined by this theory. But it is less well known that Place held his theory to be compatible with behaviourism. He draws a distinction between mental processes which he thinks are processes in the brain and mental states which he thinks, following Ryle (1949), are dispositions to talk and behave in a variety of broadly specifiable ways. The identity theory as applied to mental processes is seen as complementing rather than replacing Ryle's behaviourism. The exclusion of mental states allows Place to avoid the difficulties which confront the attempt to extend type identity theory to cover propositional attitudes, and which have led many to adopt the token identity version. Unlike token identity physicalism which regards any attempt to establish psycho-physical correlations as futile, Place's version of type identity theory predicts such correlations across individuals in the case of mental processes and within individuals in the case of mental states. This, combined with an emphasis which comes from his background in behaviourist psychology on learning as the primary source of mental/behavioural dispositions, makes it easy for Place (1991) to embrace connectionism which he regards as entirely compatible with behaviourism. He does not emphasize the compatibility between type identity theory and connectionism, probably because this point is obvious to him. There is no analogous way of establishing links with brain science in the case of token identity theory.

1.   The background of the 1956 paper

Armstrong (1993) praises Place's importance as the founder of the kind of physicalism which holds that

> "mental states, events and processes are purely physical states, events and processes in the brain. (...) Place never quite got the credit that he should have had as the pioneer, although Smart always acknowledged his role. A tactical mistake was made (...) Place's article appeared in the *British Journal of Psychology*, little read by philosophers." (Armstrong 1993, p. xiii)

Armstrong extended the physicalist thesis from mental processes to mental states, including propositional attitudes, whereas for Place the physicalist thesis was limited to sensory conscious experiences. This emphasis on the sensory at the expense of the propositional is the first hint of a move in the direction of compatibility between Place's approach and connectionism. Connectionism stresses subsymbolic or sensory processing rather than symbol manipulation.

2.   Breaking with Dualism and Behaviourism

It is generally acknowledged that Place's (1956) paper inaugurated the trend towards materialism within modern philosophy of psychology. In his philosophy of mind anthology, Lycan (1992) puts it right after the work of Carnap in this field. The identity theory superseded the preceding dualist and behaviourist views on the mind-body problem.

Place's formulation of what was later to be described as the identity theory took the form of the statement that consciousness is a process in the brain. This implies
•   breaking away from dualism in that the mental was no longer treated as separate from the physical universe, and
•   transcending behaviourism in that the existence and functional significance of inner processes was unequivocally asserted.

Place rejected behaviourism only in so far as it denies the importance of inner processes in the control of behaviour.

3.   Analysis of the statement "consciousness = brain process"

The question posed in the title of Place's 1956 paper whether consciousness is process in the brain is answered affirmatively:

$$consciousness = brain\ process.$$

The statement is analyzed and defended against the dualists.

4.   Consciousness

The concept of consciousness is ambiguous. On one interpretation it is a matter of introspective self-knowledge. On another it is a matter of sensory and para-sensory (imagery) experience. Place uses the term in the latter sense rather than the former. He emphasizes, however, that in searching for consciousness in the brain we must look for something that will explain our ability to report our private experiences, either at the time or shortly afterwards. While the interpretation of consciousness as sensory in nature has a long pedigree in psychology going back to E. B. Titchener and, before him, William James, it may be that such currency as it has in modern discussions within philosophy owes something to Place's 1956 paper.

5.   Brain

What Place has to say about the brain should be taken seriously. As a psychologist, he was acquainted with the rudiments of neurophysiology and neurology. His Identity thesis was presented as an empirically testable hypothesis. Mental imagery, *qualia* and sensations as conscious processes are construed as patterns of activity with a specific anatomical location within the structure of the brain. So far from abandoning behaviourism, Place views the brain, and consciousness as a pattern of activity within it, as having evolved by virtue of their function in bringing behaviour into line with the contingencies operating in the environment. More recently, he has explicitly affirmed the link between behaviourism and connectionism.

6.   Processes

A common misunderstanding in the interpretation of Place's version of the identity theory stems from a failure to recognize the importance of the distinction between processes and states. A process involves continuous change over time. A state remains unchanged over the period of its existence; though, as in a state of war, it may consist in what remains constant through a process of kaleidoscopic change or, as in the case of a disposition, may manifest itself from time to time in activity and change.

        The title of Place's paper tells us that consciousness is "a brain process", and that implies that consciousness must also be a process. A mental process is said to be identical with

        "the passage of nerve impulses over a thousand synapses" (1956/1991, p. 33)

and not with anything static, such as a pattern of synaptic weights.

        In talking of consciousness, Place is not speaking of beliefs and their physical underpinning in the brain microstructure. He is speaking about conscious processes, such as sensations and images. These are not propositional attitudes or emotional/motivational states which, by and large, have obvious behavioural consequences which are built into the description that is given of them. Some sensation words, 'pain' and 'itch' for example, *do* have behavioural consequences built into their meaning. Others, such as Ryle's "throbs and tingles" do not. Typically, sensations derive their behaviour-motivating function from the context of mental/behavioural dispositions in which they are embedded.

        With what are conscious processes, such as pains and other sensations, to be identified? Not with a static condition, but with the dynamic "passage of impulses." All the examples Place gives of comparable identity statements involve processes or objects subject to continuous kaleidoscopic change, examples such as "lighting = motion of electric charges", or "cloud = mass of tiny particles in suspension".

7.   Identity statements

The statement, "consciousness = brain process" is a statement of identity of the form x = y, where x and y are two predicates such that everything that is an x is also a y and vice versa. As Leibniz's law prescribes, where such an identity holds, everything that is true of all x's must also be true of all y's and vice versa. It follows from this that an identity relation cannot hold between things which belong to different ontological categories. It is argued by the dualist that there is just such a difference of ontological category between the mental and the physical, and that consequently no identity relation can hold between a mental x and a physical y. Place denies not only that the mental-physical contrast is a difference of ontological category, but also that there is *any* coherent distinction to be drawn between the two. All the important ontological categories, substance, property, relation, process, instantaneous event and state of affairs are to be found on both sides of the mental/physical divide. But although he was already aware both of the importance of these differences in ontological category and of looking for "physical" parallels for every property which has been claimed as peculiar to the mental, Place does not identify the "is" in "consciousness is a brain process" as an "is" of identity. Nor is the "is" of identity among the different uses of the word "is" he distinguishes in the 1956 paper.

        The statement "Red is a colour" contains the "is" of definition. Whereas in the statements "His table is an old packing case" and "A cloud is a mass of water droplets or other particles in suspension", we find a usage of "is" to indicate composition. An example of the "is" of predication appears in the statement "Her hat is red".

        In "consciousness is a brain process" the "is" is the "is", not of identity, but of composition. That these two relations are different is clear from the fact that whereas identity is reflexive,

symmetrical and transitive, the relation whereby something is composed of something else is non-reflexive, asymmetrical and intransitive. Nevertheless, although we cannot say that a whole is identical with the *mere* sum of the parts of which it is composed, it *is* identical with the sum of those parts when assembled in the way they are assembled so as to form that whole. This enabled Place to accept the reformulation of the thesis in terms of the identity relation, when it was subsequently defended in these terms by Feigl (1958) and Smart (1959).

8.   Contingent Identity and the Token/Type Distinction

Since Place's paper lacks the concept of identity, it was left to Smart (1959) to present the identity theory as a case of "contingent identity." Place, however, repeatedly insists on the synthetic, contingent (in the sense of its not being self-contradictory to deny) and empirical determinable character of the thesis. It is in this connection that he discusses, though not of course under that description, the distinction between token and type identity statements. His example of a token identity statement, as it would now be called, is the statement "His table is an old packing case." This statement is contingent in that there is no logical connection between "being a table" and "being an old packing case." It just so happens that in this case the two predicates apply to the same object. Most examples of contingent identity statements, including Frege's classic example "The Morning Star = the Evening Star" cited by Smart, are token identities. One reason why contingent type identities are much less common is simply that the number of predicates that are true of all tokens of a type is inevitably tiny in comparison with the number that are true of the individual token. Another reason, according to Place, is

> "that if we lived in a world in which all tables without exception were packing cases, 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 colour." (Place 1956/1991 pp. 31-2)

In other words, once the truth of a type identity statement is generally known, it becomes analytic and necessary (in the sense that its denial is self-contradictory). Such statements will only be *contingent* in cases where either the co-extension of the two predicates is not a matter of common knowledge or, as in the consciousness/brain process case, has not yet been established empirically.

9.   Token-Identity Physicalism

Token Physicalism (Davidson) claims that every token of a mental state type is the same individual as a token of some physical neurological state type, but that different tokens of the same mental state type are identical with tokens of a *different* physical neurological state type. Suppose that the thought "The cat is on the mat" occurs to me at t_1. This thought, according to the token physicalist, consists in a different type of neurological event, not only when someone else thinks the same thought, but when the same thought occurs to me again at t_2.

It seems that at least one of the motives for adopting this token version of physicalism is that if, following Armstrong, type identity physicalism is extended to mental states in general and propositional attitudes in particular, we have to suppose that the semantic content of such attitudes is a property of the brain state in which it consists. This is a problem for such a view because two vital parts of the semantic content of any sentence which expresses a proposition lie outside the brain of the attitude's possessor. These are the referents of any referring expressions the sentence contains and the linguistic conventions the make it an intelligible sentence in the natural language to which it belongs. Place's type identity physicalism which is restricted to consciousness construed as a sensory process avoids this difficulty by interpreting a propositional attitude as a disposition to talk and behave in a variety of ways consonant with the meaning of the sentence which expresses the proposition. That disposition has a basis in a state of the microstructure of the brain; but the "relationship between a

dispositional property and its so-called 'categorical basis' in the microstructure of the entity which possesses that property is a relation, not of identity, but of causal dependence on the part of the disposition on the state of the microstructure." (1989, p. 21) Thus "my believing that it is going to rain depends upon, but is not identical with some state of the microstructure of the brain." (1989, p. 21) The only thing that the state of the brain which underpins my thought "It is going to rain" need have in common with the state of the brain underpinning your having the same thought is that both brain states have the same effect, the occurrence of a thought with the same semantic content. Within the individual, on the other hand, it would be most surprising if different occurrences of the same thought did not have the same cause in the microstructure of the brain.

10.   Type Physicalism and Connectionism

According to Davidsonian token-physicalism, the correlation of psychical and physical, is "deduced *a priori* from (...) self-evident principles" (1989, p. 20). Token physicalism implies that "empirical evidence of psycho-physical correlation is irrelevant" (1989, p. 20). Unlike Place's version of type identity physicalism, in which "the mind-brain identity theory was presented as a scientific hypothesis" (1989, p. 20) token identity physicalism is a piece of philosophical dogma which can only be defended by a priori argument. Armstrong's single factor version of type physicalism concedes the relevance of empirically discovered psycho-physical correlations, but makes their discovery in the case of propositional attitudes a difficult, if not insoluble, problem. Place's two factor theory of mentality, by contrast, can unreservedly embrace recent developments, such as connectionism and Edelman's (1987) Neural Darwinism which seek to explain mentality in terms of the properties of artificially constructed and naturally occurring neural networks respectively. It can do so, moreover, without having to dismiss our ordinary mental talk ("folk psychology") as an outdated irrelevance as does the eliminative materialist.
        Place's theory leads him to distinguish three kinds of mental entity:
(a) *mental processes* which are processes in the brain,
(b) *mental states* which he thinks are behavioural dispositions which are *not* identical with the states of the brain microstructure on which they depend in a causal sense,
(c) *instantaneous mental events* which he takes to be what occurs when an antecedent mental process initiates a subsequent and consequent mental state.
        At the expense of some oversimplification, this threefold distinction can be illustrated in terms of the properties of a connectionist network:
(a) *Mental/brain processes* correspond to the activity of the network as it transforms an input into an output.
(b) *Mental/dispositional states* correspond to the output-generating properties of the network which depend causally on the weights of the various synaptic connections between the nodes or neurons that make up the network.
(c) *Instantaneous mental events* correspond to the changes in the weights of the nodes/neurons and the output characteristics of the network that depend on them which occur as a consequence of activity within it.

11.   Type Physicalism is naturalistic; token Physicalism is not

Place argues for type-identity physicalism in the case mental processes and for dispositional/brain state dualist interpretation of mental states; whereas token-physicalism, the thesis that each token of a mental type, whether state or process, is realized in a token of a different physical type, is embraced by most contemporary materialists. At first sight, token identity physicalism might appear more congenial to connectionism in that it reduces everything mental to the cerebral. But its denial that there are any psycho-physical correlations to be found puts no constraints whatever on any theory of

how the mental is implemented in the brain. It is thus no more and no less compatible with a connectionist than with a digital computer model. Place's two factor theory by contrast makes specific predictions as to the type of psycho-physical correlations to be expected: correlations that apply across individuals in the case of mental processes, correlations that apply only within individuals in the case of mental states. Although the digital computer model is not conclusively ruled out, this view is much more at home with a connectionist model.

      If consciousness (mental process) is viewed as primarily sensory in nature, it makes sense that the similarity between the sensory apparatus, not only of different members of the same species, but also of different species should result in uniformities across individuals in this respect. If mental states are the behavioural dispositions acquired by individuals as a consequence of their particular learning history, it makes sense that the "state of the brain microstructure" (1989, p. 20) which generates the disposition to produce a particular output given a particular input should vary from individual to individual.

12.   Connectionism and the resurrection of Behaviourism

For ten years between 1960 and 1970, Place was in practice as a clinical psychologist and behaviour therapist. This experience of the practical application of behaviourist principles to clinical problems led him to the following conclusions:

      1. What justifies the traditional behaviourist suspicion of explanations of behaviour which appeal to the propositional attitudes (means-end beliefs) of the agent is that such explanations presuppose linguistic competence on the part of the agent and the control of behaviour by a self-directed sentence expressing the proposition in question.

      2. This renders the use of such explanations blatantly fictitious when applied to the behaviour of pre-linguistic organisms (animals and human infants) or to the skilled and habitual performances of older children and adults.

      3. Even in those cases where the presuppositions of linguistic competence and linguistic control apply, the rational and consistent connection between what people say and what they do on which propositional attitude explanations and predictions of behaviour rely is not the product of some innate mechanism in the brain. It is an habitual response maintained by its effect in avoiding the stigma of irrationality and madness whose application to those who deviate from this social norm is unconsciously promoted by society in order to ensure the predictability in these terms of its members' behaviour.

      4. Since they presuppose linguistic competence and linguistic control of behaviour on the part of the agent, explanations of language and the linguistic control of behaviour which involve the ascription of propositional attitudes to either speaker or listener are viciously circular.

      Place concluded from this that, in order to provide a scientific description and explanation of behaviour in general and linguistic behaviour in particular at the molar (as opposed to the molecular or brain microstructural) level, an alternative to the propositional attitude or belief-desire form of explanation is needed. Though defective in some respects particularly, as Chomsky (1959) has argued, the account of language given in Skinner's (1957) book *Verbal Behavior*, Skinner's "behaviour analysis" is seen as filling that gap.

      This is a standpoint for which Place has found it difficult to find a receptive audience due to the climate of opinion in philosophy and psychology created by the cognitive revolution of the nineteen sixties. Because of his criticisms of Skinner, even Skinner's few remaining followers regard his views as dangerously heretical.

      It goes without saying that, as a long-standing champion of type identity physicalism, Place is critical of Skinner's well known, but frequently misunderstood, rejection of explanations of behaviour in terms of brain physiology. But, discarding this aspect of Skinner's position, has enabled him to see beyond the barrier which it creates and recognise the affinity between behaviourism and such recent developments as connectionism and Edelman's (1987) Neural Darwinism.

The form of behaviourism which flourished in psychology prior to the cognitive revolution was committed to claiming that:

B1. attributing beliefs and other propositional attitudes to the behaving organism is unacceptable in a scientific theory of behaviour,

B2. principles of syntax and logic are abstractions from social norms maintained by selective social reinforcement within the linguistic community constituted by speakers of a particular natural language,

B3. thinking is the self-directed form of verbal behaviour whose primary function is interpersonal communication and which is a form of learned behaviour acquired in accordance with the same principles of learning as are observed in the animal laboratory,

B4. explaining behaviour in terms of the activity of the brain is the job of the physiologist, not the psychologist (a view peculiar to B. F. Skinner).

The cognitive psychology's adoption of the digital computer as a model of the functioning of the mind/brain challenged these claims in that:

C1. computer scientists cannot adequately describe what a computer does without ascribing propositional attitudes to it,

C2. formal principles of syntax and logic play a causal generative role in the computer's functioning,

C3. a digital computer cannot begin to work unless the ability to respond appropriately to a pattern of digital pulses which conform to the "machine language" (Fodor's, 1985, "language of thought" is the brain's machine language) is "hardwired" into the device at its construction,

C4. using the digital computer model offers the prospect of explaining the functioning of the brain in generating a behavioural output without a specialized knowledge of brain physiology.

The adoption of the connectionist model as an alternative to the digital computer model leads to the abandonment of the first three (C1-C3) of these respects in which the digital computer challenges behaviourism, and thus opens the door to a return to the behaviourist view. Only the last of these principles (C4), the commitment to explaining behaviour as a function of brain activity, survives.

Endorsing B1 - B3 leads, according to Place, to the acceptance of the behaviouristically based connectionist model of mind. He sees no inconsistency between this and his rejection of B4 which is in line with a long tradition of behaviourist theory going back to Watson and Lashley. It is not seriously at odds with Skinner who is more concerned to claim his right study the environment-behaviour interface separately from the brain-behaviour interface than to deny that the brain-behaviour story is a legitimate part of psychology.

13.   Rules and contingencies

The digital computer is a device designed from the outset to do quickly and efficiently something that one species of mammal, *homo sapiens*, has only very recently acquired the ability to do, namely manipulate symbols. Abandoning the digital computer model in favour of connectionism means abandoning the idea that language, in the form of Fodor's language of thought, together with the ability to manipulate symbols of all kinds, are innately implanted in the animal as well as the human brain. It returns us to the idea that language and symbol manipulation are (a) peculiar to humans, (b) learned and (c) belong in the first instance to the public intersubjective domain.

This change in perspective, Place thinks, should draw our attention to Skinner's (1969) distinction between "contingency-shaped" and "rule-governed" behaviour whose introduction in the late nineteen sixties when the cognitive revolution was already under way has prevented it from getting the attention it deserves from the wider psychological and philosophical community. According to Skinner, all behaviour is a matter of adapting to environmental contingencies. A contingency in his sense is a situation in which, under certain *antecedent* conditions, *behaving* in certain way will have or is liable to have a certain *consequence*. All of the behaviour of pre-linguistic organisms, animals and human infants together with the skilled and habitual behaviour of the linguistically competent is *contingency-shaped*. That is to say it is shaped through a process of trial

and error-correction as a consequence of repeated exposure to the actual sequence of events in which the contingency consists.

The human capacity for language once acquired makes available to those who possess it another way of adapting to contingencies, one which does not require that the agent have personal experience of them. In this case the contingencies are specified linguistically in the form of what Skinner calls "a rule." Behaviour controlled by a rule is said to be "rule-governed." In the light of this distinction we can say that, like the brain, a connectionist network is adapted to the generation of contingency-shaped behaviour through the process of trial and error-correction. The digital computer, on the other hand, is a device created by the brain to perform the kind complex symbol-manipulations which are needed for accurate specification of complex contingencies, but which, as an organ primarily adapted to the generation of contingency-shaped behaviour, it finds difficult to do quickly and efficiently.

The main disparities between the digital computer model and the actual functioning of the brain are as follows:
*   Some tasks, such as complex calculations, are performed slowly and inefficiently by the human brain and quickly and efficiently by the computer.
*   Intuitive grasp of complex relations which is characteristic of visual perception, both animal and human, cannot be achieved by checking through a list of items, as the digital computer does.
*   The time taken for one neuron to excite another is far too long to allow it do what it does, if it proceeded in the step by step, item by item, way that the computer proceeds.
*   There is no evidence that "memories" are stored in the brain in a anatomically discrete memory store like that of the digital computer.

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