

## Essay Review

KARL R. POPPER and J. C. ECCLES, *The self and its brain. An argument for interactionism*. Berlin, Heidelberg, London, New York: Springer Verlag, 1977. 597 pp. DM39/\$17.20/£9.40.

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1. *Introduction*. The spectacle of these two aged but worthy knights, one a distinguished philosopher of science, the other a distinguished neurologist, riding forth together to slay the dragon of Materialism in defense of the doctrine of Trialist Interactionism, is irresistible even if, at the end of the day, the dragon remains unslain and the doctrine collapses into absurdity. That the dragon remains unslain is hardly surprising, since neither author appears to have understood the doctrine that he is criticising. Thus Popper maintains that 'we can divide those who hold the doctrine that men are machines or a similar doctrine, into two categories: those who deny the existence of mental events, of personal experiences, or of consciousness; ... and those who admit the existence of mental events, but assert that they are 'epiphenomena'—that everything can be explained without them, since the material world is causally closed' (pp. 4–5). Later he argues that 'the theory of brain-mind identity turns out... to be a special case of the idea of psycho-physical parallelism' (p. 93), a charge which is repeated by Eccles on p. 361.

This contention that the mid-brain identity theory is a form of psycho-physical parallelism seems to rest on some such argument as this: if experiences are identical with neural events, these experiences cannot affect or be affected by neural events; but if, as the identity theorist concedes, experiences occur, it follows that they must occur without affecting or being affected by neural events. For the benefit of anyone who may not have spotted it, what is wrong with this argument is its first move. What follows from the hypothesis that experiences are identical with certain neural events, is that experiences cannot *be said to* affect or be affected by the neural events with which on this view they are identical, not that experiences, *qua* neural events, do not affect and are not affected by *other* neural events whether they be neural events which are themselves identical with other experiences or ones which are not identical with any experience.

Faced with misunderstandings such as this, and with a philosopher who prefaces his arguments against the materialist or identity view of the mind-brain relation with a declaration to the effect that 'terminology is of course quite irrelevant' (Popper, p. 2), there seems little point in attempting to rehearse and rebut the somewhat depressing collection of tired arguments against different varieties of materialism that Popper appears to have dredged up from his memory of the philosophical textbooks of half a century ago. It seems more profitable to examine the positive doctrine of Trialist or Three-World Interactionism which he is trying to defend, and the extraordinary antics of Eccles in attempting to map that doctrine onto the cyto-architecture of the human brain.

2. *Popper's Three Worlds and their intellectual antecedents*. Popper's Three-World doctrine would appear to be a somewhat unsatisfactory amalgam of two earlier doctrines, the three worlds which the logician Gottlob Frege distinguishes in his

essay 'Der Gedanke. eine logische Untersuchung';<sup>1</sup> and the three worlds distinguished by the existential psychiatrist Ludwig Binswanger in his *Ausgewählte Vorträge und Aufsätze* (Selected essays and addresses) published in 1947. Frege's purpose in 'Der Gedanke' is to distinguish two kinds of object that can be said to exist independently of the *Innenwelt* (Inner World) of *Vorstellungen* (private experiences and private conceptions)<sup>2</sup> unique to the individual mind (Popper's World 2). On the one hand there is the *Aussenwelt* (External World—roughly Popper's World 1), the world of spatially ordered objects existing through time, and on the other 'eine drittes Reich', a third world of *Gedanken*, thoughts, propositions and theories which are either true or false, but whose truth or falsity is independent both of the individual mind which grasps the thought in question and of the time and place of its expression and communication in words or symbols.

Binswanger's view derives from the work of the biologist Baron von Uexküll, who drew a distinction between the *Umwelt* or biological environment of an organism (World 1) and the *Eigenwelt* or private representation of that environment which each individual human being constructs for himself (World 2). To these Binswanger adds a third world, the *Mitwelt*, which is the representation of their common environment (*Umwelt*—World 1) which is built up by a human society as a consequence of the ability to create linguistic and other symbolic representations of the environment whereby beliefs about it which would otherwise be confined to the *Eigenwelt* of the isolated individual, can be communicated from one individual to another.

The influence of the von Uexküll-Binswanger view is apparent in the way in which Popper's Worlds 2 and 3 are presented as emergent biological characteristics, whose Darwinian natural selection depends on their ability to interact with World 1 in a way which promotes the survival of the species. The influence of Frege's view is apparent in the presentation of Worlds 1, 2 and 3 as comprising objects of different ontological status and in the argument which Popper develops on pp. 41–43 and 56–57 in order to show that there are at least some objects in his world 3, namely abstract objects like prime numbers and Russell's paradox, which exist independently both of their expression in terms of World 1 objects 'like books or gramophone records' and their expression in terms of World 2 objects like the private thoughts and memories of particular individuals.

Another feature of Popper's doctrine which comes from Frege is the kind of object that inhabits his World 2. The objects which inhabit Binswanger's *Eigenwelt* (World 2) and *Mitwelt* (World 3) are what Brentano called 'intentional objects', the objects of thought and conception which, apart from a few mythical objects like unicorns and centaurs, are the counterparts of objects which inhabit the *Umwelt* (World 1), whereas the inhabitants of Popper's World 2, like the inhabitants of Frege's *Innenwelt*, are the mental acts and mental states whereby these intentional objects are conceived and thought about. The External World (*Aussenwelt*—World 1) consists of objects which exist at a place over a period of time independently of any human observer. The Inner World (*Innenwelt*—World 2) consists of objects which exist only in so far as they are had or experienced by a particular human mind; the third world consists of objects which exist timelessly by virtue of the logical

<sup>1</sup> *Beiträge dtsh. Idealismus*, 1 (1918) 58–77 *Kleine Schriften* (ed I Angelelli 1967, Darmstadt). 342–361 This paper is available in English translations by A. M. and M. Quinton as 'The thought a logical enquiry', *Mind*, 65 (1956), 289–311 (also in P. F. Strawson (ed.), *Philosophical logic* (1967, London, O U P 17–38)); and by P. T. Geach as 'Thoughts' in G. Frege, *Logical investigations* (1976 Oxford, Blackwell), 1–30

<sup>2</sup> Frege's German word 'Vorstellung' is translated both by the Quintons and by Geach as 'idea', which is acceptable only if understood in the sense in which 'idea' is used by Berkeley. The same idea, in the ordinary English sense, can have more than one owner and thus corresponds to Frege's *Gedanke* rather than to his *Vorstellung*, which is essentially private and exclusive to a single owner.

possibility of their formulation in language or mathematical symbolism. It is only with respect to different worlds in *this* sense that a case can be made out for the autonomy or logical independence of one world from another, and even here it is only the timelessness of the existence of Frege's *Gedanken* which separates their existence from the temporal existence of the other two worlds whose ontological independence from one another can only be established if it can be shown, as Descartes tried to do, that spatial concepts have no genuine application to the so-called Inner World (itself a spatial concept). By the same token, it makes no sense to talk of the historical evolution of a timelessly existing world of *Gedanken* and abstract mathematical objects like prime numbers. Nor does it make any sense to talk of such an object causally interacting with objects in a world of space and time. Things like Pythagoras's theorem and Russell's paradox cannot in themselves either affect or be affected by what happens in the world of time and space: they can only be grasped, discovered and forgotten; and it is only their being grasped, discovered or forgotten which has any effect on human lives.

Binswanger's three worlds are worlds of a very different kind from this. His *Umwelt* is no doubt co-extensive with Frege's *Aussenwelt*, but it is viewed, not as a set of objects with a common ontological status, but as the common environment of all living organisms. The *Eigenwelt* and the *Mitwelt* are quite different. They are worlds only in the derivative sense of being more or less accurate representations of 'cognitive maps' of the 'real world', the *Umwelt*—World 1. The ability of an individual organism to construct such a map or representation of its present and probable future environment, as is implied by the von Uexküll concept of the *Eigenwelt*, clearly is a biological characteristic whose survival value would ensure the natural selection of a species which had acquired it; and the same is true of the expansion of the individual *Eigenwelt* made possible by linguistic communication of the contents of one *Eigenwelt* to another and the consequent formation of a *Mitwelt* or cognitive map of their common environment or *Umwelt* which is shared by the members of human social groups. Moreover the biological utility of such cognitive maps clearly depends on a three-way interaction between these worlds. The *Eigenwelt* (World 2) must regulate the overt behaviour of the individual organism and at the same time must be continually modified by the *Umwelt* so as to correspond in all important respects to the actual and probable future state of the *Umwelt* from moment to moment, while the utility of the *Mitwelt* (World 3) depends on its influence on the individual *Eigenwelt* of the members of the social group, each of whom makes his own contribution both to the extent and to the accuracy with which the *Umwelt* is represented in the *Mitwelt*.

Furthermore, although there is a genuine difference in ontological status between the intentional objects which comprise the *Eigenwelt* and the *Mitwelt* and their real-life counterparts in the *Umwelt*, the spoken and written words, the symbols, drawings, maps, diagrams and models by means of which one individual communicates the contents of his *Eigenwelt* to others and in terms of which the *Mitwelt* of the social group is expressed, as well as the activities of speaking, writing, drawing and modelling whereby they are produced, are firmly anchored in the *Umwelt* (World 1) as even Popper admits. But if *they* are part of World 1, why not the mental images and fragments of subvocal speech in terms of which the individual portrays his *Eigenwelt* to himself and the mental activities and states involved in their production? Certainly David Armstrong finds no difficulty in incorporating the notion of the brain as the constructor and possessor of 'a cognitive map' of the environment like the *Eigenwelt* into his Materialist theory of the mind.<sup>3</sup>

<sup>3</sup> See his *A materialist theory of the mind* (1968 London, Routledge and Kegan Paul) 209–210

3. *Eccles and the Cartesian interpretation of Popper's Three Worlds.* By confounding these two sets of threefold distinctions, each of which is perfectly defensible in its original context, Popper deprives his Three Worlds doctrine of the kind of consistency which would be required in order to prevent the almost unbelievable distortion which the doctrine undergoes in the hands of Eccles. Eccles's account of the mind-brain relation belongs to a quite different and much older philosophical tradition than either Frege's logical doctrine or Binswanger's existentialism that underlie Popper's Three Worlds. It is almost pure Cartesian dualist interactionism only slightly modified to accommodate the advances in our knowledge of the brain that have taken place over the past three hundred years. The identification of Poppers' Worlds 2 and 3 with different parts of the Cartesian story is purely nominal. The key move is Eccles's identification of Popper's World 2 with the Cartesian Ego, 'the Conscious Self', as Eccles calls it, the *res cogitans*, the disembodied owner of my thoughts and experiences. This identification has no authority in either of the two sources of Popper's doctrine; nor, despite appearances, is it consistent with Popper's own account. Frege, in his essay on 'The thought' quite specifically denies that the owner of my *Vorstellungen* is itself a *Vorstellung* and thus an inhabitant of his *Innenwelt* (World 2): 'A certain idea [*Vorstellung*] in my consciousness may be associated with the word 'I'. But then this is one idea among other ideas and I am its owner as I am the owner of the other ideas. I have an idea of myself but I am not identical with this idea'.<sup>4</sup> Likewise the owner of the von Uexküll-Binswanger *Eigenwelt* is the living organism, the human individual that creates it, not some mysterious entity that belongs to and presides over it.

Popper's discussion of the self in chapter P4 does not, as he himself freely admits, 'pretend to have any such unity or system' as he attributes to the self itself. He expresses his conviction that selves exist (p. 101) and implies that the self is an entity distinct from the brain with which it is in extremely close liaison (p. 118). But since he rejects Hume's view that 'the self is no more than the sum total (bundle) of its experiences' (p. 103), one can only assume that he rejects any identification of the self with his World 2 which consists of just such a bundle. But neither, by Frege's argument, can it, as owner of the mental states that comprise World 2, be one of those mental states. Consequently, despite his convictions, I can only conclude that there is no place in any of Popper's three worlds for an entity such as he takes the self to be.

Eccles's identification of Popper's World 3 with the Memory Store is even more of a travesty than is his identification of World 2 with the Cartesian Ego or Conscious Self. The idea of consigning the memory store to another world, instead of following Descartes who consigned it to the brain on the grounds that it is not part of current consciousness (*cogitatio*) which for him is the sole basis for the existence of the *res cogitans*, is attractive to Eccles as a way of getting round the problem presented by evidence such as the phenomenon of retrograde amnesia which shows that the brain does not store information in the way that a computer does in discrete anatomically located memory banks. Unfortunately, Eccles's notion of World 3 as a memory store connected to World 2 (the conscious self) *via* neural pathways inside that World 1 object, the brain, makes very little sense if Popper's World 3 is interpreted in either of the two senses distinguished. It is true that the shared beliefs of a social group which constitutes Binswanger's World 3, the *Mitwelt*, is stored in the memories of its members. But to say *that*, is to say that the *Mitwelt* is what is common to the *Eigenwelte* or World 2's of individual group members, which shows us that on this interpretation it is World 2 rather than World 3 that is stored in the memory of the individual. Even so, the *Eigenwelt* corresponds to what is *contained* in the memory

<sup>4</sup> Frege (footnote 1), Geach translation, 22

store rather than the store which contains it, as Eccles's account requires. Frege's Third World of *Gedanken*, on the other hand, although containing a great deal of information, could not plausibly play the role of a memory store, partly because it contains too much information—all true propositions and theories regardless of whether or not they have previously come to the attention of the individual in question—and partly because it also contains all possible misinformation—all logically possible but false propositions and theories.

4. *The Self-conscious mind and the brain.* Perhaps the most valuable part of this book are chapters E1 to E6, in which Eccles provides us with a masterly summary of the present state of neurophysiological knowledge relating to the localisation of psychological functions within the human cerebral cortex; and what is most remarkable about this section and the subsequent Chapter E7, in which he gives his account of the interaction between the cerebral cortex and the Self-conscious Mind (World 2), is his insistence on the role that is played by the brain in general and the cerebral cortex in particular in any kind of intellectual performance or motor skill. But since he believes both in the independent existence of the self-conscious mind and in its interaction with the brain, he is compelled to reserve some specific function or functions in the regulation of thought and behaviour for the self-conscious mind. The two functions which he ascribes to the operation of the self-conscious mind are (1) that of selectively attending to the 'active centres in the modules of the liaison areas of the dominant cerebral hemisphere' and integrating 'its selection to give the unity of conscious experience from moment to moment' (p. 355), and (2) that of initiating voluntary movement.

The bizarre nature of this theory can be illustrated by considering the sequence of events which, on Eccles's view, would be involved in a simple reaction time experiment in which the subject is instructed to press to key whenever a light appears on a display in front of him. The first step in the chain of events in an experiment of this kind is the selective attention that is paid by the self-conscious mind (World 2) to the activity in some of the cortical modules in the auditory liaison areas in the temporal lobe of the dominant hemisphere. This allows the activity in the relevant modules to be transmitted to the neighbouring Wernicke speech area where it is interpreted as a spoken instruction to press the key whenever a light appears on the display. This instruction is then transmitted for storage to the memory store (World 3) from which a continuous message is transmitted back along neural pathways in the cortex to the self-conscious mind (World 2) which has the effect of keeping the self-conscious mind 'on the look out for' activity in the cortical modules in the visual liaison areas in the occipital lobe. When such activity is noticed by the self-conscious mind it is passed on to a neighbouring area of the brain where it is interpreted as a light appearing on the display in front of the subject. It then has to be compared with the memory of the previous instruction stored in World 3 before it is passed back to the self-conscious mind which initiates 'an increase of neuronal activity over... (a) wide area of the cerebral cortex, and then a long and complex moulding process leading to the eventual homing in on the motor pyramidal cells that are appropriate for bringing about the desired movement' (pp. 364–365). There then follows a further change in the selective attention paid by the self-conscious mind in accordance with instructions received *via* neural pathways from the memory store (World 3) towards cortical modules in the parietal and occipital lobes corresponding to the kinaesthetic and visual feedback from the key-tapping movement as it develops, which again have to be interpreted by the brain and checked for conformity to the instructions stored in World 3, which in turn leads to a further set of corrective instructions being issued by World 2 in the case where the feedback fails to conform to the required pattern.

However, this analysis does not take into account the fact that in the light of the split-brain studies of Sperry and his associates, which he reviews in Chapter E5, Eccles is forced to conclude that World 2 (the self-conscious mind) is in direct communication only with the dominant hemisphere of the cerebral cortex. Unlike Sperry himself, who is led by the evidence from these studies to conclude that the effect of commissurotomy is to create two independent consciousnesses, only one of which, that associated with the dominant hemisphere, is able to talk to us, Eccles, for Cartesian reasons presumably, cannot accept any such splitting of the self-conscious mind. But in the face of the evidence of a total lack of communication between the two hemispheres once the *corpus callosum* is severed, he cannot hold that World 2 is in communication with both hemispheres; for if it were, it is difficult to see why information should not pass from one hemisphere to the other *via* the self-conscious mind. On the other hand, as is shown by Figure E5-7 (p. 327), he has no corresponding qualms about splitting World 3 into two parts, thus providing each hemisphere with its own memory store. Yet the reason that Descartes gives for denying that a *res cogitans* can be split, is that the *res cogitans* is not extended in space and it only makes sense to talk of dividing entities which are so extended; and unless Eccles is prepared to identify World 3 with particular area of the brain, as he apparently is not, World 3 should by that argument be no more divisible than is World 2.

But what provides the final *reductio ad absurdum* of Eccles's theory is the fact, demonstrated by the work of Sperry and his associates, that the minor hemisphere in the commissurotomized subject, although unable to speak, is perfectly capable of understanding simple instructions like the instruction to press a key whenever a light appears on a display and is significantly better than the so-called dominant hemisphere in carrying them out, provided, of course, that the stimulus is presented in that half of the visual field to which it has access. What this shows in terms of Eccles's theory is that the functions of selective attention and the initiation of voluntary movement can be more than adequately carried out by the minor hemisphere without any intervention from the self-conscious mind. But if the minor hemisphere can get along perfectly well without World 2, why have all this shunting back and forth between the brain and an extra-spatial World 2 in the case of the dominant hemisphere?

<sup>5</sup> R. W. Sperry, 'Lateral specialization in the surgically separated hemispheres', in F. O. Schmitt and F. G. Worden, (eds.) *The neurosciences third study program* (1974, Cambridge, Mass., M.I.T. Press), 5-19; quoted by Eccles on p. 325 of *The self and its brain*.