

# ON BENJAMIN LIBET: IS THE MIND AHEAD OF THE BRAIN? BEHIND IT?

by Ted Honderich

Determinism and Freedom Website -- <http://www.ucl.ac.uk/~uctytho/libetnew.html>

The most scientific, speculative and copious thinking bearing on free will in the past three decades or so is in *The Self and Its Brain*, by the philosopher of science Karl Popper and the Nobel neurophysiologist J. C. Eccles. It is a kind of celebration of a thing called the self-conscious mind and its freedom. It depends greatly on the research of some Californian neurophysiologists with Professor Benjamin Libet at their head. The research in question is taken as showing, in brief, that the mind is ahead of the brain. This research, however, has been succeeded by another period or tranche of research. It is taken by Libet himself and others to be as relevant, indeed as powerful, with respect to the question of determinism and freedom. What it comes to, until a surprising second thought, is that the mind is behind the brain. If high reasoning by philosophers on freedom uninformed by science cannot now be reassuring, nor is there reassurance in the idea that science is uniquely placed to decide the questions. It is somewhat less uniquely placed than philosophy. I include the piece below in a forthcoming book, *On Determinism and Freedom* (Edinburgh University Press, 2005), partly in order to illustrate that general point for those in need of the illustration. They include quite a few workers in the flourishing industry of the science of consciousness.

-----

## 1. Some Experimental Findings About Experiences

Benjamin Libet and also Libet and collaborators claim to advance a single hypothesis, with important consequences, about the time of a conscious experience in relation to the time when there occurs a certain physical condition in the brain. This condition is spoken of as *neural adequacy for the experience*, or, as we can as well say, *neural adequacy*.<sup>5</sup> This finding has been taken to throw doubt on theories that take neural and mental events to be in necessary or lawlike connection, and also certain identity theories of mind and brain, as well as determinist theories generally. The hypothesis derives in part from many previous findings.<sup>6</sup> Karl Popper and J. C. Eccles use it as evidence for an ambitious view that asserts a kind of surveillance and control of the brain by 'the self-conscious mind', despite some acting of the brain on the self-conscious mind.<sup>7</sup>

What is maintained by the experimenters derives from two sets of experimental findings pertaining to certain neural activity and to the time-order of a subject's pairs of sensory experiences, and also from a finding having to do with some electrical activity in the part of the brain that is the somatosensory cortex. These findings are the set 1 to 3 below, and then the set 4 to 7, and then 8.

Very roughly, findings 1 to 3 are to the effect that there is a certain *delay* after an earlier event in the occurrence of something associated with a sensory experience. But finding 4 apparently conflicts with this. Others of the findings are used to give an explanation of the apparent conflict.

(1) Experiments on neurosurgery patients, with their agreement, and in conjunction with surgical operations, are said to have established a fact. It is that after the beginning of a small electrical stimulation applied directly by inserted electrodes to part of the brain, the postcentral *cortex*, there is a considerable delay, up to about half a second (500 milliseconds -- 500 msec) before something happens. That is electrical activity in the cortex reaching 'neural adequacy' for eliciting a certain conscious sensory experience on the part of the patient. What is said to be delayed, to repeat, is precisely the condition of 'neural adequacy', about which we are not told much, as distinct from the conscious experience itself, whatever is to be said of *its* time of occurrence.

(2) There is said to be a very similar delay in conscious experience, again up to about half a second, with respect to direct stimulation of another part of the brain -- direct stimulation trains to the *subcortex*.

(3) There is also said to be the same delay of about 500 msec in consciousness with a single pulse of electricity to the skin of the hand -- *peripheral* stimulation.

As against these delays, there are other findings, the first being crucial.

(4) If the skin of the hand of a patient is stimulated later than the beginning of a certain stimulus direct to the brain, you would expect to hear from the subject that the conscious skin-experience came *after* the other conscious experience. More precisely, if a single-pulse stimulus to the skin of the hand at just above threshold level is applied 200 or 300 msec after the beginning of a stimulus train direct to somatosensory *cortex*, you would expect that subjects would report that the conscious experience for the skin stimulus began *after* conscious experience for the cortical stimulus. This would also be expected on the basis of findings 1 and 3. Reports of tests, however, very

remarkably, were predominantly of experience for the skin stimulus beginning *before* experience for the cortical stimulus.

(5) There is no such surprising order of conscious experiences reported with *subcortical* stimulation. If a skin stimulus is applied later than the beginning of a subcortical stimulus train, subjects report that the sensory experience owed to the skin stimulus began after sensory experience owed to the subcortical stimulation. When it should have, so to speak.

(6) Similarly, if the beginning of subcortical stimulation is simultaneous with a *peripheral* stimulus to the skin of the hand, subjects report simultaneous sensory experiences.

(7) Similarly again, if a skin stimulus is applied before the beginning of subcortical stimulation, subjects report that experience of the skin stimulus came before experience owed to the subcortical stimulation.

(8) And finally, *peripheral* stimuli and *subcortical* stimuli very quickly elicit some other electrical activity in the brain. This is a relatively localized 'primary' evoked potential in somatosensory cortex, owed importantly to a certain system in the brain -- the specific (lemniscal) projection system. The onset of this electrical activity, also referred to as the arrival of a fast projection volley, is only about 15 msec after a stimulus to the hand. Very quick. However, a stimulus train applied direct to somatosensory cortex does not elicit a similar type of response.

So the first set of findings 1 to 3 are to the effect that neural adequacy for any sensory experience is achieved only after a certain delay, about half a second. But finding 4, which is indeed crucial, appears to conflict with this. That is, the ordering by subjects of their experiences is this: *conscious-experience-owed-to-later-skin-stimulus came before conscious-experience-owed-to-earlier-cortical-stimulus*. This suggests that the experience of the peripheral stimulus occurs considerably *sooner* than about half a second later. This is also the case with subcortical stimulation, but not with cortical stimulation, as indicated by findings 5, 6 and 7.

## 2. Statements of An Hypothesis

The two sets of findings, together with (8) the finding of some early electrical activity, are said by Libet and collaborators to issue in what will concern us a lot more, a single hypothesis with significant consequences. In itself, it is about about the timing of conscious sensory experiences owed to peripheral and subcortical stimulation. We are also given an explanation of what is postulated in the hypothesis. The explanation of what is postulated has to do in part with something of which you will eventually hear the little bit more that is necessary -- the early electrical activity in (8).

In fact some statements made by the authors are of one hypothesis, or suggest it. Other statements are of, or suggest, a different hypothesis. It will be necessary, partly for fairness, to quote extensively.

The following statements S1 to S5 are somehow to this effect: a conscious experience occurs at a certain time but is 'antedated' to the time of the early electrical activity, the 'primary' evoked potential having to do with the specific (lemniscal) projection system.

(S1) '[The hypothesis] postulates (a) the existence of a subjective referral of the timing for a sensory experience, and (b) a role for the specific (lemniscal) projection system in mediating such a subjective referral of timing.'<sup>8</sup>

(S2) '(1) Some neuronal process associated with the early or primary evoked response, of SI (somatosensory) cortex to a skin stimulus, is postulated to serve as a 'time-marker'. (2) There is an automatic subjective referral of the conscious experience backwards in time to this time-marker, after the delayed neural adequacy at cerebral levels has been achieved (see Fig. 2).'<sup>9</sup> The sensory experience would be 'antedated' from the actual delayed time at which the neuronal state became adequate to elicit it; and the experience would appear subjectively to occur with no significant delay from the arrival of the fast projection volley.'<sup>10</sup>

(S3) 'The results obtained in these experiments provide specific support for our present proposal, that is, for the existence of a subjective temporal referral of a sensory experience by which the subjective timing is retroactively antedated to the time of the primary cortical response (elicited by the lemniscal input).'<sup>11</sup>

(S4) 'The specific projection system is already regarded as the provider of localized cerebral signals that function in fine spatial discrimination, including the subjective referral of sensory experience in space. Our present hypothesis expands the role for this system to include a function in the temporal dimension. The same cortical responses to specific fast projection inputs would also provide timing signals. They would subserve subjective referral in such a way as to help 'correct' the subjective timing (relative to the sensory stimulus), in spite of actual substantial delays in the time to achieve neural adequacy for the 'production' of the conscious sensory experience.'<sup>12</sup>

(S5) '...for a peripheral sensory input, (a) the primary evoked response of sensory cortex to the specific projection (lemniscal) input is associated with a process that can serve as a 'time-marker'; and (b) after delayed neural adequacy is achieved, there is a subjective referral of the sensory experience backwards in time so as to coincide with this initial 'time-marker'.<sup>13</sup>

These statements are certainly not all clear -- I do not refer to their technicalities -- but their burden is that such a conscious experience as that of a stimulus to the skin of the hand occurs only when neural adequacy is achieved, but the experience is somehow 'antedated' or 'referred' to an earlier time. That is, despite what is said of the experience's involving 'subjective referral backwards in time', the experience itself occurs only about half a second after the beginning of stimulation. The experience does not occur at the time to which it is 'referred'.

This is also what is conveyed by the experimenters, as will be worth noting, in one of their diagrams and several other passages. Their figure, reproduced here as [Figure 1](#), has to do in the main with the early electrical activity, the 'primary' evoked potential.<sup>14</sup>

(S6) It is stated of the figure in part: 'Diagram representing the 'average evoked response' (AER) recordable on the surface of human primary somatosensory cortex (SI) in relation to the...hypothesis on timing of the sensory experience. Below the AER, the first line shows the approximate delay in achieving the state of 'neuronal adequacy' that appears (on the basis of other evidence) to be necessary for eliciting the sensory experience. The second line shows the postulated retroactive referral of the subjective timing of the experience, from the time of 'neuronal adequacy' backwards to some time associated with the primary surface-positive component of the evoked potential.'<sup>15</sup>

Presumably 'neuronal adequacy' is not taken as necessary for eliciting what has *already* happened, earlier in time. The experience, at the later time, is merely 'referred' to the earlier.

(S7) It is stated that the hypothesis in question 'deals with the problem of a substantial neuronal time delay apparently required for the 'encoding' of a conscious sensory experience, by introducing the concept of a subjective referral of sensory experience in the temporal dimension.'<sup>16</sup>

Finally, there is what is said of a quite different idea, owed to Donald MacKay. MacKay's idea 'accepts our proposal that there is substantial delay in achieving neural adequacy with all inputs, peripheral or central; but it would argue that, in those cases where there is apparent antedating of the subjective timings of the sensory experience, the subjective referral backwards in time may be due to an illusory judgement made by the subject when he *reports* the timings... For example, it could be argued that during the recall process, cerebral mechanisms might 'read back' via some memory device to the primary evoked response and now construe the timing of the experience to have occurred earlier than it in fact did occur.'<sup>17</sup>

An amendment of this idea from MacKay is contemplated, one that is said in fact to turn it into the hypothesis of Libet *et al*:

(S8) '...if any 'read back' to the primary timing signal does occur, it would seem simpler to assume that this takes place at the time when neuronal adequacy for the experience is first achieved, when the 'memory' of the timing signal would be fresher; such a process would then produce the retroactive subjective referral we have postulated.'<sup>18</sup>

So -- the burden of all that has been reported here so far, in statements S1 to S8, is the *delay-and-antedating hypothesis*.

Such a conscious experience as that of a skin stimulus occurs only at the time when 'neuronal adequacy' has been achieved, about half a second after the beginning of stimulation, despite the fact of 'antedating'.

By way of a headline, *the mind is not ahead of the brain, despite the mind's antedating capability*.

On the other hand the following statements S9 to S15 are different. Some have to do with the authors' figure reproduced here as [Figure 2](#), pertaining to the crucial finding 4, about the subjects' surprising ordering of experiences. It could hardly be clearer in its quite different import.<sup>19</sup>

(S9) In the figure the S-experience (experience of a skin stimulus) is specified as 'actually before C-experience' (experience owed to cortical stimulation). It is shown as occurring only a few msec after the stimulus-pulse (S-pulse).

(S10) In the note to the diagram it is stated: 'If S were followed by a... delay of 500 msec of cortical activity before neural adequacy' is achieved, initiation of S-experience might...have been expected to be delayed until 700 msec of C [stimulus train to somatosensory cortex] had elapsed. In fact, S-experience was reported to appear subjectively before C-experience....' The note, although perhaps less definite in its intention, thus accords with the diagram.

(S10) What the crucial finding 4 established, it is said and implied, is that conscious experience of certain stimulation did not occur at the time of neural adequacy. 'If the *subjective experience* were to occur at the same time as the achievement of neural adequacy in the case of either stimulus, one would expect the subject to report that the conscious sensory experience for the C stimulus began before that for the threshold S pulse (Fig. 1<sup>20</sup>).... However, the pooled reports were predominantly those of sensory experience for the C (cortical) stimulus beginning *after*, not before, that for a delayed threshold S pulse...'<sup>21</sup>

(S11) It is stated, of the crucial finding 4, that 'the subjective experience of the skin stimulus occurs relatively quickly after the delivery of the S pulse, rather than after the expected delay of up to about 500 msec for development of neural adequacy following the S input.'<sup>22</sup> That is, the skin-stimulus experience itself occurs earlier, rather than after the expected delay.

(12) It is flatly stated that 'subjective experience of a peripherally-induced sensation is found to appear without the substantial delay found for the experience of a cortically induced sensation.'<sup>23</sup>

(S13) Very importantly, it is noted that findings 1, 2 and 3 above, about delay in achieving neural adequacy, are *not* to be taken in a natural way, as asserting or implying that the experiences in question are subject to the given delay. That is left open. 'The two timings, for subjective experience vs. neural adequacy, might not necessarily be identical.'<sup>24</sup>

(S14) It is stated that the hypothesis in question introduces 'an asynchrony or discrepancy between the timing of a subjective experience and the time when the state of 'neuronal adequacy' associated with the experience is achieved.'<sup>25</sup>

(S15) It is stated that there is 'a dissociation between the timings of the corresponding 'mental' and 'physical' events.'<sup>26</sup>

The burden of all these statements (S9 to S15), although some phrases might be taken as ambiguous, is not the delay-and-antedating hypothesis but what we can call the *no-delay hypothesis*.

A conscious experience occurs earlier rather than later, i.e. before about half a second after the beginning of stimulation rather than about half a second after the beginning of stimulation.

By way of a headline, and one is certainly needed for the news, *the mind is ahead of the brain*.

As remarked, Popper and Eccles use the hypothesis of Libet and collaborators, whatever it is, to argue for the existence of 'the self-conscious mind'. Eccles states the hypothesis a number of times. Compare (a) and (b) with (c) and (d).

(a) 'The experiments of Libet on the human brain...show that direct stimulation of the somaesthetic cortex results in a conscious sensory experience after a delay as long as 0.5 sec ... although there is this delay in experiencing the peripheral stimulus, it is actually judged to be much earlier, at about the time of cortical arrival of the afferent input... This antedating process does not seem to be explicable by any neurophysiological process. Presumably it is a strategy that has been learnt by the self-conscious mind..., the antedating of the sensory experience is attributable to the ability of the self-conscious mind to make slight temporal adjustments, i.e. to play tricks with time...'<sup>27</sup>

(b) '...Libet developed a most interesting hypothesis, namely that, though a weak single (SS) just threshold single skin stimulus requires up to 0.5 sec of cortical activity before it can be experienced, in the experiencing process it is antedated by being referred in time to the initial evoked response of the cortex....'<sup>28</sup>

(c) 'The...experimental design tested the supposition that a just-threshold single skin stimulus (SS) was effective in producing a conscious sensation after the same incubation period. . . as a just-threshold train of cortical stimulation (CS), which is as long as 0.5 sec. If that were so, when the SS was applied *during* the minimal CS train, the SS should be experienced *after* the CS; but it was usually experienced *before!*'<sup>29</sup>

(d) 'There can be a temporal discrepancy between neural events and the experiences of the self-conscious mind.'<sup>30</sup>

Passages a and b are to the effect that the experience is later (i.e. about half a second after the beginning of stimulation) and is somehow antedated. Passages c and d say otherwise. The experience is earlier -- i.e. not nearly so much as about half a second after the beginning of stimulation. There is the same inconsistency suggested by two parts of a diagram<sup>31</sup> reproduced here as [Figure 3](#).

Part D has to do with tests whose details are not all relevant to the present point. What is relevant is that a just-threshold single skin stimulus (SS<sub>2</sub>) is shown as giving rise to an experience whose 'actual time' is about 600 msec later. There is 'antedating', somehow involving 'ER [evoked response] time', which is not further explained. Consider part B of the diagram, however, which pertains to the crucial finding (4) above. CS is cortical stimulation. The SS experience is shown in the diagram as *actually occurring* earlier rather than later. The diagram specifies 'SS experience before CS [experience]'

### 3. Inconsistency, Delay-and-Antedating

We need to come to a first conclusion. *There is an inconsistency involving two hypotheses in the work of Libet et al. and Popper and Eccles* -- and, incidentally, in other reports of the work of Libet *et al.*<sup>32</sup> The inconsistency is

worth noting for itself. Not both the hypothesis that there is delay in experience but antedating, the delay-and-antedating hypothesis, *and* the hypothesis that there is no such delay, the no-delay hypothesis, can be true.

That conclusion carries corollaries, of course. One is that *there must be doubts about the putative findings*. Certainly if the delay-and-antedating hypothesis is true, then if there are putative findings that entail the no-delay hypothesis, those findings are false. The like corollary has to do with taking the no-delay hypothesis to be true. Any putative findings that entail the delay-and-antedating hypothesis are then false. It is not within my competence, however, to examine these findings in detail, notably the crucial finding 4.

The inconsistency itself and hence the fact that there are two hypotheses in question are important, partly for further conclusions of mine. But it can confidently be said that it is the delay-and-antedating hypothesis to which the authors, at bottom, are committed. It is certainly the hypothesis to be preferred. In my view, the authors' failure to notice, despite their commitment, that there are two inconsistent hypotheses in question, has had a certain effect on their understanding of the consequences of the delay-and-antedating hypothesis, consequences for the mind-brain issue. It is my suggestion that failing to notice the inconsistency, and hence that there are two hypotheses on hand, has been significant in enabling Libet *et al.* and Popper and Eccles,<sup>33</sup> to come to certain conclusions about lawlike connection between simultaneous mental and neural events, about identity theories, and about the self-conscious mind and free will.

To consider another matter first, however, how are we to understand the preferable hypothesis, the one that does not put the mind ahead of the brain? It is in part that an experience is somehow 'antedated' or 'retroactively antedated' or 'referred back' to a 'time-marker'. What does that come to? Very little account of the supposed phenomenon itself is given, as distinct from what is supposed to explain it.

The central idea appears to be that a subject has a conscious sensory experience including or involving or accompanied by the belief or impression that it is not *then* happening. He may have a conscious sensory experience, reportable as 'sensation in skin of hand', which conscious sensory experience occurs about half a second after stimulation, and after another sensory experience. His experience of the skin sensation includes or involves or is accompanied by the belief or impression that the sensation occurred significantly earlier than about half a second after stimulation, before the other sensory experience. There seem to be very great difficulties in this idea -- which, it must be remembered, is crucially different from Mackay's simpler idea noticed earlier.

It is true, surely, that the actual having of *any* conscious sensory experience includes or involves or is accompanied by the belief or impression that the experience is *present*. That is, it is *now*. It is *happening*. Further, it might be said that there is the belief or impression that the experience is *after* another experience, immediately prior in time. The having of any experience, that is, somehow brings in a belief or impression as to a temporal property (presentness) and perhaps also a temporal relation (after another experience).<sup>34</sup>

But then the supposed phenomenon of a conscious sensory experience we have been considering, the phenomenon of 'antedating' or 'referring back', involves imputing something very like certain self-contradictory beliefs to subjects. It involves, more precisely, imputing something like simultaneously-held, fully explicit self-contradictory beliefs. This is quite distinct from the common sort of self-contradiction where the conflicting beliefs are not brought together. The supposed phenomenon, by way of a kind of summary description, is the phenomenon of a conscious experience which a subject might describe in the words 'present-sensation past' or 'now-sensation then', or perhaps 'later-sensation earlier'.

Libet *et al.* say that the processes in referral or antedating are to be regarded as 'unconscious and "automatic" in nature and...not distinguishable by the subject'.<sup>35</sup> What processes are there in question is not entirely clear. However, we cannot choose to regard a *conscious* sensory experience as something of which the subject is *unaware*. It seems, to repeat, that a conception of presentness and perhaps of a temporal relation enters into the having of any sensation. Are there *really* certain experiences such that the involved belief or impression as to presentness is, so to speak, simultaneously denied? On the assumption that a belief or impression of a temporal relation enters into the having of any sensation, can it be that there are certain experiences such that the belief or impression is simultaneously denied?

As illustrated above in statement S4, it is said that the supposed antedating phenomenon is related to something else, another fact also owed to the specific (lemniscal) projection system. '...the concept of subjective referral in the spatial dimension, and the discrepancy between subjective and neuronal spatial configurations, has long been recognized and accepted; that is, the spatial form of a subject sensory experience need not be identical with the spatial pattern of the activated cerebral neuronal system that gives rise to this experience.'<sup>36</sup> Also, 'The newly proposed functional role for the specific projection system would be additional to its known role in spatial referral and discrimination.'<sup>37</sup>

In fact, however, there is no relevant analogy whatever between 'temporal referral', of the kind with which we are concerned, and the given obvious 'discrepancy' known since the beginning of neuroscience between (i) spatial experience or things as experienced in space and (ii) neural spatial configurations. The neural bit for the tree on the left is not itself to the left of the neural bit for the tree on the right. The latter 'discrepancy' obviously involves no kind of self-contradictory experience, the simultaneous occurrence of contradictory beliefs or impressions.

Libet remarks that hypotheses in general are the weaker for involving *ad hoc* assumptions.<sup>38</sup> It is also said that hypotheses in general are the weaker for involving 'added assumptions'.<sup>39</sup> It is my own second and tentative conclusion here that the delay-and-antedating hypothesis is open to objection along these lines. *The delay-and-antedating hypothesis, being factitious and also obscure, is at least open to doubt.* However, it is not within my competence to judge the findings that are put in question, or whose interpretation is put in question, if the delay-and-antedating hypothesis is rejected.

#### **4. Mind and Brain, Free Will, A Conjecture, Contradiction**

To turn now to mind-brain theories, it is said that 'on the face of it, an apparent lack of synchrony between the 'mental' and the 'physical' would appear to provide an experimentally-based argument against 'identity theory', as the latter is formulated by Feigl, Popper, etc.'<sup>40</sup>

However, it is allowed that a certain reply to the argument is possible. The reply is not specified. It is then said, presumably about psychoneural lawlike connection, that 'a temporal dissociation between the mental and the physical events would further strain the concept of psychophysiological parallelism or, if one prefers, of co-occurrence of corresponding mental and neural states. It could thus have an impact on the philosophical interpretation of such parallelism or co-occurrence when formulating alternative theories of the mind-brain relationship.'

In a later article it is said, differently, that 'dissociation between timings of the corresponding "mental" and "physical" events' raises serious but not insurmountable difficulties for identity theories, but that the dissociation does not contradict 'the theory of psychophysical parallelism or correspondence'.<sup>41</sup> The seeming change of mind about these theories is not explained.

In a still later article it is said that 'the temporal discrepancy creates relative difficulties for identity theory, but... these are not insurmountable'.<sup>42</sup> It is said, further, that the data are 'compatible with the theory of 'mental' and 'physical' correspondence',<sup>43</sup> and that the data do 'introduce a novel experimentally-based feature into our views of psychophysiological correspondence, with some interesting philosophical implications that merit analysis'.<sup>44</sup> Further, it is said, without explanation: 'What we are discussing is not any denial of correspondence between mental and physical events, but rather the way in which the correspondence is actually manifested'.<sup>45</sup>

I am uncertain what to make of what is said, so vaguely, of psychophysical 'correspondence'. Can such 'correspondence' hold between events at different times? Does such 'correspondence' require only such a loose connection between the brain and the 'self-conscious mind' as posited by Popper and Eccles?

It is clear how the findings as to the timing of conscious experiences may be taken to threaten the hypothesis of psychoneural lawlike connection, of which you heard earlier, or certain identity theories, or parallelist theories. Evidently a conscious experience cannot be identical in a real sense with a neural event if the mental and neural items have different temporal locations or durations. Consider the claim that a conscious experience was identical with the physical process that constituted 'neural adequacy' for it. The claim must be false if the experience and the processes occurred at different times.

Again, the hypothesis of psychoneural lawlike correlation naturally takes the correlated mental and physical items to be simultaneous. That is part of the theory. Evidently, if the studies of Libet *et al.* did establish of certain mental and neural items that they were not simultaneous, this would indeed raise a difficulty for the given theory of psychoneural lawlike correlation. The same is true, evidently, of a parallelist theory denying psychophysical lawlike correlation but involving psychophysical simultaneity, the parallelism taken as simply inexplicable or somehow owed to ongoing divine intervention. It is a theory, perhaps, which has no contemporary defenders.

Finally, if there were mental events separate in time from their neural bases, that might be taken as going some way towards supporting the theory of the self-conscious mind. Given what seems to me the obscurity of that theory, I shall not attempt to say more about why that might be true. A remark of Popper and Eccles in a passage quoted above (p. 000) carries the idea that something plays tricks with time, which thing is the self-conscious mind. There, admittedly, they are to be taken as speaking of the 'trick' of 'antedating'.

If there were mental events separate from their neural bases, by the way, that would not only affect precisely the hypothesis of psychoneural lawlike correlation in a theory of determinism and also the theory of the self-conscious mind. It would affect thinking about freedom more generally. Partly because of later work of his on determinism

and freedom, it seems to me likely that Libet is of this attitude in the work we are considering. What this thought amounts to, put it one way, is that if the mind is ahead of the brain, there is a strangeness or mystery about the mind that does not sit well with determinism, or determinism as we naturally conceive it. There might conceivably be a determinism of or covering the mind in its very surprising independence, but it would be odd indeed. It would be a determinism separated from a determinism of the brain.

It is clear, to sum up, that the findings as to the timings of conscious experiences may be taken to have these various consequences *if* the findings are taken as issuing in the no-delay hypothesis. That is one fact, about which I shall say a word more in a moment. Another fact, to repeat, is that clearly it is the delay-and-antedating hypothesis that is favoured by the authors, despite their inconsistency.

It is my conjecture that the authors, not having clearly distinguished the two quite different hypotheses about timing, have supposed that the studies in question have somehow established the no-delay hypothesis, to the effect that certain mental and physical items are not simultaneous. That, fundamentally, is why they draw their conclusions about the mind-brain relation. However, they must choose one or the other of the two hypotheses, and the one they favour, the delay-and-antedating hypothesis, is not at all to the effect that certain mental and physical items lack simultaneity. The idea that the mind is ahead of the brain, if you could hold it, would indeed affect a good deal, but it is not the idea you can think about, or think much about.

The experience of the skin stimulus, on the delay-and-antedating hypothesis, is simultaneous with the neural process that is taken to constitute 'neural adequacy' for it. The experience may indeed be of a strange self-contradictory kind. This in itself, so long as psychoneural simultaneity is preserved, is no problem whatever for the proposition of psychoneural lawlike correlation or identity theories. Nor, evidently, is a problem raised by the fact that the experience in one part somehow has reference to an earlier time. That in itself does not make the experience non-simultaneous with its physical process -- no more than does the very different referring feature of an ordinary memory or recall-experience make that experience non-simultaneous with its 'neuronally adequate' physical process, or time-distortion in an hallucination make that experience non-simultaneous with the related physical process.

It may be supposed, I have said, that both the hypothesis of psychoneural lawlike correlations and identity theories would be affected by the no-delay hypothesis, the idea to which the authors do *not* incline, but which appears to have influenced their thinking. Still, as you will indeed have anticipated, that is not all that is to be said about the idea. It would not only put two things at different times, thereby threatening the mentioned mind-brain theory and some others. The no-delay idea, to remember, is as follows.

Neural adequacy for a certain experience is achieved only about half a second after the beginning of stimulation, but the experience occurs before then.

What is this 'neural adequacy'? It appears to be neural condition that is a kind of sufficient condition for the emergence of the experience. There are certain quite general philosophical problems here,<sup>46</sup> but it must appear that the mind-ahead-of-brain hypothesis is in fact false because self-contradictory: it asserts or very strongly implies both that something cannot occur before a certain time -- before an explanatory sufficient condition occurs -- and that it does. It is true, as allowed above, that if the studies of Libet *et al.* did actually establish of certain mental and neural items that they were not simultaneous, this would raise a difficulty for, say, the theory of psychophysical lawlike correlation. But it must be false that a mental item occurs before the physical item on whose later existence it depends and which explains it.

## 5. The Later Research

There have been, so to speak, two periods, tranches or lines of research and theorizing by Libet and his collaborators. In the first, as you have heard, to revert to the philosophically relevant headline, what does the work is an idea, not brought out of a confusion, that the mind is ahead of the brain. In the second period, things are very different, and the consequences for freedom and determinism are made more explicit. In this case, what will be provided is an overview leaving out almost all experimental details and the like.<sup>47</sup>

The research of the first period had to do with the brain and with sensory *experiences* -- such experiences as a feeling in the skin of a hand. The experiments of the second period, also carried out on consenting neurosurgery patients, had to do with what are yet more directly relevant to determinism and freedom -- what are named voluntary actions. These are said to be actions wanted or initiated by the person and also not prompted or cued in any way by anyone else, or anything external to the person.

The patients were asked to perform a simple voluntary action, a flick of the wrist, whenever they wished during a period when their brain activities were being recorded. They might do so 40 times. What was confirmed by the experimenters was that a certain electrical change in the brain, a neural process named the readiness potential or

RP, occurred about a half-second before the wrist muscle was activated -- an average of about 550 msec before. When did the conscious wish or intention or willing to perform the action occur? Before or at the time of the brain process? 'In the traditional view of conscious will and free will,' according to Libet, 'one would expect conscious will to appear before, or at the onset of the RP, and thus command the brain to perform the intended act.'<sup>48</sup>

A good method of enabling the subjects to report the clock-time of this event of willing was developed, tested and used. The willing, intention or wishing -- the subject's first awareness of it -- was in fact not before the brain process but about 350 or 400 msec *after* it started. So the mind is *behind* the brain. 'The initiation of the freely voluntary act appears to begin in the brain unconsciously, well before the person consciously knows he wants to act!' But a question is immediately asked. 'Is there...any role for conscious will in the performance of a voluntary act?'<sup>49</sup> Libet's answer is that there can be, that there is in some cases.

The mentioned conscious willing 350 or 400 msec after the brain process RP is still about 150 msec before the wrist muscle is activated. So there is time for some more conscious willing. 'Potentially available to the conscious function is the possibility of stopping or vetoing the final progress of the volitional process, so that no actual muscle action ensues. *Conscious will could thus affect the outcome* of the volitional process even though the latter was initiated by unconscious cerebral processes. Conscious-will might block or veto the process, so that no act occurs.'<sup>50</sup> There is a bit of indirect evidence, we are told, to support this.

A question arises, of course. As Libet asks, does the conscious veto, like an earlier conscious wish, intention or willing to flick a wrist, itself have its origin in a preceding unconscious process? The answer: 'I propose, instead, that the conscious veto may *not* require or be the direct result of preceding unconscious processes. The conscious veto is a *control* function, differently from simply becoming aware of the wish to act. There is no logical imperative in any mind-brain theory, even identity theory, that requires specific neural activity to precede and determine the nature of a conscious control function. And, there is no experimental evidence against the possibility that the control process may appear without development by prior unconscious processes.'<sup>51</sup>

That is not quite all. There is, we are told, a deeper question. Think again of the story of the brain process RP in advance, the later conscious willing, the conscious veto if that happens, and the flicking of the wrist. Is all of that subject to determinism or not? Or rather, could it be that 'our consciously willed acts are fully determined by natural laws that govern the activities of nerve cells in the brain'?.<sup>52</sup> In response to the question, the indeterministic interpretation of Quantum Theory is mentioned, but it is concluded we cannot really answer the question. We can say indeterminism is at least as good an option, scientifically speaking, as the determinism. And that there is almost universal experience that we make free, independent choices, which is 'a kind of prima facie evidence that conscious mental processes can causatively control some brain processes.'<sup>53</sup>

So there you have it. In the earlier period of research, what led our researchers and commentators to their conclusions about the mind-body problem and freedom was the proposition, existing in a kind of confusion, that the mind is *ahead* of the brain. In the later period of research, what do we have?<sup>54</sup> Well, the mind is sometimes or usually *behind* the brain -- as where the brain process RP is followed by the conscious wish to flick the wrist and then the flicking. But sometimes, when there is a veto, the mind really is *ahead* of the brain.

This theory is to be compared with the determinism sketched earlier. In that determinist theory, a conscious or mental event such as an active intention or willing is in necessary or lawlike connection with a simultaneous neural event. There are no active intentions or other mental events that are without neural correlates. Each psychoneural pair, like any resulting action, is the effect of a causal sequence that almost certainly has in it other psychoneural pairs. That is, there are phases of the sequence that are both neural and mental. Also, there can be and are likely to be phases that are wholly neural and/or wholly bodily. Furthermore, the sequence consists in causal circumstances, as explained earlier (p. 00). As in the case of any causal sequence, therefore, there are many causal circumstances for the effect -- each, whether earlier or later or with elements at different times, necessitates the effect.

As against this, with respect to the second period of Libet research in particular, we seem to have vagueness, difficulties and questions. This has partly to do with the fact that the research involves no good grip on causation and explanation. The verbs in the passages quoted above indicate this clearly. What is it for something to command, initiate, have a role in, stop or block, affect, require, be the origin of have as a direct result, control, determine, develop or causatively control something else? And what does all that talk come to if it is taken as consistent with *indeterminism*, the truth of an indeterminist interpretation of Quantum Theory and so on? Further, it is notable that we are left uncertain, despite the use of the term 'voluntary action', whether the freedom in question at several points is voluntariness or origination as we have understood them. We could also go back to the first period of research, incidentally, and wonder about something's being neurally adequate for something else, but let us not.

Also, in the theory we are now considering, how *are* the conscious events related to what is going on in the brain itself, generally speaking? Can it be that what is assumed is an interactionism of mind and brain, something that



seemed to have receded into the past? The idea of a mental process going on with no neural correlate at all, precisely a ghostly or free-floating thing, but then causing a neural process, and also the other way on?<sup>55</sup> Further, as you will have noticed about the theory under consideration, there is also a problem of whether determinism is consistently understood. It sometimes seems to be the proposition that mental or conscious events and also our actions are somehow effects of only neural sequences, which proposition includes epiphenomenalism. Sometimes, on the other hand, determinism seems to be the proposition that mental or conscious events and actions are somehow effects of both neural and mental sequences.

It is my impression that the theory under consideration might not have come into being if matters of these several kinds had been considered. Still, could the Libet theory be put into better shape by attention to these matters? Might it be saved? Well, there are some particular questions and difficulties.

We first hear that for each voluntary action there is a neural event, the readiness potential, about half a second before, not accompanied by anything conscious. This is taken to put in doubt that the subsequent action of wrist-flicking is significantly a matter of conscious will or free will. Implicit in this, evidently, is the other proposition that there was no relevant conscious event of choice, decision, inclination, impulse or the like *before* the neural event -- before the readiness potential. No evidence is provided for this proposition. So it could be, despite the RP, that the wrist-flicking was actually *originated* by a conscious act of will or something of the sort. The wrist-flicking could be *voluntary* too, of course, in our own defined sense, in virtue of the earlier choice or of course a choice, decision, inclination or the like in favour of the wrist-flicking *after* the RP. What is most important here, however, is that what has been provided so far is no evidence whatever against any decent determinism, as is allowed.

We now hear, however, of the possibility of the vetoing, that second piece of conscious willing. Are we to understand, as it seems we are to understand, that such a conscious event is not only not owed to a previous brain process -- its own readiness potential -- but also is *independent* of what is then going on neurally in the brain? That would, I take it, be an extraordinary claim. It is surely unbelievable either that there was no neural correlate of the vetoing, that it was free-floating, or that the conscious vetoing by itself was a causal circumstance for no wrist-flicking. Certainly no evidence whatever is offered for either of these propositions -- either of these ways in which it could be said the mind is ahead of the brain.

But the short story here is that this speculation as to a subject's changing his mind about an action that was contemplated or in some sense begun is a speculation that is again no ground at all for doubt of determinism. The speculation is given no significant support at all by the neurophysiological findings, notably the spare 150 msec left over for a change of mind or the like. There is no reason whatever given for describing such an episode in terms of origination or free will.

As for the indeterminist interpretation of Quantum Theory, and the proposition that we are all aware of making free and independent choices, let me leave these items for consideration in another context. It is hard to resist a word, though, on a sample opinion you have heard about mind and brain, that 'conscious mental processes can causatively control brain processes'. What does it mean? If it means that a conscious process unconnected with any brain process is a causal circumstance or the like for a brain process, is it not safe to say that the whole of the rest of neuroscience is against the speculation?

In the determinism sketched earlier, the mind and the brain go together, neither ahead or behind. It is my view that the two bodies of research we have been considering do nothing to disturb such a view. It would be remarkable if they did.

## NOTES

1. See my *On Consciousness* (Edinburgh University Press, 2004), pp. 5, 16, 19, 46, 150, 204, 206.
2. The propositions have also been looked at, for example, by Daniel Dennett and Marcel Kinsbourne, in 'Time and the Observer', in *The Nature of Consciousness: Philosophical Debates* (MIT Press, 1997), edited by Ned Block, Owen Flanagan and Guven Guzeldere. See also Alfred R. Mele, 'Decisions, Intentions, Urges and Free Will: Why Libet Has Not Shown What He Says He Has', in J. Campbell, M. O'Rourke and D. Shier, eds., *Explanation and Causation: Topics in Contemporary Philosophy* (MIT Press, forthcoming). And ???
3. See, for example, the contributions to *The Volitional Brain: Towards a Science of Free Will*, edited by Libet, Anthony Freeman and Keith Sutherland (Imprint Academic, 1999), which also has much comment on Libet's later findings in it. As for the philosophy and science of consciousness, it is certainly not the case that consciousness should be thought about only by the first. Both are needed, See my *On Consciousness*, p. 1 and thereafter.
4. For a kind of overview, see *Neurophysiology of Consciousness: Selected Papers and New Essays by Benjamin Libet* (Birkhauser, 1993).

5. Libet, 'Neuronal vs. Subjective Timing for a Conscious Sensory Experience', in *Cerebral Correlates of Conscious Experience*, ed. P. Buser, P. and A. Rougeul-Buser (Elsevier, 1978); Libet, 'The Experimental Evidence of Subjective Referral Backwards in Time', *Philosophy of Science*, 1981; Libet, E. W. Wright, B. Feinstein, and D. K. Pearl, 'Subjective Referral of the Timing for a Conscious Sensory Experience', *Brain*, 1979. Libet replied to the original version of the paper you are reading. See 'Subjective Antedating of Sensory Experience and Mind-Brain Theories', *Journal of Theoretical Biology*, 1984. See also my 'Mind, Brain and Time: Rejoinder to Libet', *Journal of Theoretical Biology*, 1986.
6. Libet, 'Cortical Activation in Conscious and Unconscious Experience', *Perspectives in Biology and Medicine*, 1965; Libet, 'Brain Stimulation and the Threshold of Conscious Experience', in *Brain and Conscious Experience*, ed. J. C. Eccles, Springer, 1966; Libet, 'Electrical Stimulation of Cortex in Human Subjects and Conscious Sensory Aspects', *Handbook of Sensory Physiology*, Vol. 2, ed. A. Iggo (Springer, 1973); Libet, W. W. Alberts, E. W. Wright, L. D. Delattre, G. Levin and B. Feinstein, 'Production of Threshold Levels of Conscious Sensation by Electrical Stimulation of Human Somatosensory Cortex', *Journal of Neurophysiology*, 1964; Libet, W. W. Alberts, F. W. Wright and B. Feinstein, 'Responses of Human Somatosensory Cortex to Stimuli Below Threshold of Conscious Intention', *Science* 1967; Libet, W. W. Alberts, E. W. Wright, and B. Feinstein, 'Cortical and Thalamic Activation in Conscious Sensory Experience', *Neurophysiology Studied in Man*, ed. G. G. Somjen, *Excerpta Medica*, 1972; Libet, W. W. Alberts, E. W. Wright, M. Lewis and B. Feinstein, 'Cortical Representation of Evoked Potentials Relative to Conscious Sensory Responses, and of Somatosensory Qualities -- in Man', in *The Somatosensory System*, ed. H. H. Kornhuber (Georg Thieme, 1975).
7. K. R. Popper, K. R. & J. C. Eccles, *The Self and Its Brain*, (Springer, 1977).
8. Libet, E. W. Wright, B. Feinstein, and D. K. Pearl, 'Subjective Referral of the Timing for a Conscious Sensory Experience', *Brain*, 1979, p. 193.
9. This is Fig. 1 in the present paper by me.
10. Libet, E. W. Wright, B. Feinstein, and D. K. Pearl, 'Subjective Referral of the Timing for a Conscious Sensory Experience', *Brain*, 1979, pp. 20 1-2. Cf. Libet, 'Neuronal vs. Subjective Timing for a Conscious Sensory Experience', in *Cerebral Correlates of Conscious Experience*, ed. P. Buser, P. and A. Rougeul-Buser (Elsevier, 1978) p. 75.
11. Libet, E. W. Wright, B. Feinstein, and D. K. Pearl, 'Subjective Referral of the Timing for a Conscious Sensory Experience', *Brain*, 1979, p. 217.
12. Libet, E. W. Wright, B. Feinstein, and D. K. Pearl, 'Subjective Referral of the Timing for a Conscious Sensory Experience', *Brain*, 1979, pp. 220-1.
13. Libet, E. W. Wright, B. Feinstein, and D. K. Pearl, 'Subjective Referral of the Timing for a Conscious Sensory Experience', *Brain*, 1979, p. 222.
14. From Figure 2 in B. Libet, E. W. Wright, B. Feinstein, and D. K. Pearl, 'Subjective Referral of the Timing for a Conscious Sensory Experience', *Brain*, 1979, p. 201.
15. Libet, E. W. Wright, B. Feinstein, and D. K. Pearl, 'Subjective Referral of the Timing for a Conscious Sensory Experience', *Brain*, 1979, p. 201.
16. Libet, E. W. Wright, B. Feinstein, and D. K. Pearl, 'Subjective Referral of the Timing for a Conscious Sensory Experience', *Brain*, 1979, p. 221.
17. Libet, E. W. Wright, B. Feinstein, and D. K. Pearl, 'Subjective Referral of the Timing for a Conscious Sensory Experience', *Brain*, 1979, pp. 219-20.
18. Libet, E. W. Wright, B. Feinstein, and D. K. Pearl, 'Subjective Referral of the Timing for a Conscious Sensory Experience', *Brain*, 1979, p. 220.
19. From Figure I in B. Libet, E. W. Wright, B. Feinstein, and D. K. Pearl, 'Subjective Referral of the Timing for a Conscious Sensory Experience', *Brain*, 1979, p. 199.
20. That is, my Figure 2.
21. B. Libet, E. W. Wright, B. Feinstein, and D. K. Pearl, 'Subjective Referral of the Timing for a Conscious Sensory Experience', *Brain*, 1979, pp. 199-200.
22. Libet, E. W. Wright, B. Feinstein, and D. K. Pearl, 'Subjective Referral of the Timing for a Conscious Sensory Experience', *Brain*, 1979, p. 200.
23. Libet, E. W. Wright, B. Feinstein, and D. K. Pearl, 'Subjective Referral of the Timing for a Conscious Sensory Experience', *Brain*, 1979, p. 222.

24. Libet, E. W. Wright, B. Feinstein, and D. K. Pearl, 'Subjective Referral of the Timing for a Conscious Sensory Experience', *Brain*, 1979, p. 200. Cf. Libet, 'Neuronal vs. Subjective Timing for a Conscious Sensory Experience', in *Cerebral Correlates of Conscious Experience*, ed. P Buser, P. and A. Rougeul-Buser (Elsevier, 1978), p. 75.
25. Libet, E. W. Wright, B. Feinstein, and D. K. Pearl, 'Subjective Referral of the Timing for a Conscious Sensory Experience', *Brain*, 1979, p. 221.
26. Libet, E. W. Wright, B. Feinstein, and D. K. Pearl, 'Subjective Referral of the Timing for a Conscious Sensory Experience', *Brain*, 1979, p. 222.
27. Popper & Eccles, *The Self and Its Brain*, p. 364.
28. Popper & Eccles, *The Self and Its Brain*, 1977, p. 259.
29. Popper & Eccles, *The Self and Its Brain*, p. 257.
30. Popper & Eccles, *The Self and Its Brain*, p. 362.
31. From Popper and Eccles, *The Self and Its Brain*, Fig. E2-3, p. 258.
32. C. W. Cotman and J. L. McGaugh, *Behavioural Neuroscience* (Academic Press, 1980), pp. 806-7.
33. Popper & Eccles, *The Self and Its Brain*, pp. 531, 565.
34. Honderich, T. (1977. 'Temporal Relations and Temporal Properties: *Time and the Philosophies*, ed. P. Ricoeur (UNESCO, 1977). [Add Gale?]
35. 'Subjective Referral of the Timing for a Conscious Sensory Experience', *Brain*, 1979, p. 220.
36. Libet, E. W. Wright, B. Feinstein, and D. K. Pearl, , 'Subjective Referral of the Timing for a Conscious Sensory Experience', *Brain*, 1979, *Brain*, 1979, p. 221.
37. Libet, E. W. Wright, B. Feinstein, and D. K. Pearl, , 'Subjective Referral of the Timing for a Conscious Sensory Experience', *Brain*, 1979, *Brain*, 1979, p. 222.
38. Libet, 'Neuronal vs. Subjective Timing for a Conscious Sensory Experience', in *Cerebral Correlates of Conscious Experience*, ed. P Buser, P. and A. Rougeul-Buser (Elsevier, 1978), p. 74).
39. Libet, E. W. Wright, B. Feinstein, and D. K. Pearl, , 'Subjective Referral of the Timing for a Conscious Sensory Experience', *Brain*, 1979, p. 220).
40. Libet, 'Neuronal vs. Subjective Timing for a Conscious Sensory Experience', in *Cerebral Correlates of Conscious Experience*, ed. P Buser, P. and A. Rougeul-Buser (Elsevier, 1978), p. 80.
41. Libet, E. W. Wright, B. Feinstein, and D. K. Pearl, , 'Subjective Referral of the Timing for a Conscious Sensory Experience', *Brain*, 1979, pp. 221-2.
42. Libet, 'The Experimental Evidence of Subjective Referral Backwards in Time', *Philosophy of Science*, 1981, p. 196.
43. Libet, 'The Experimental Evidence of Subjective Referral Backwards in Time', *Philosophy of Science*, 1981, p. 182.
44. Libet, 'The Experimental Evidence of Subjective Referral Backwards in Time', *Philosophy of Science*, 1981, p. 183
45. 'The Experimental Evidence of Subjective Referral Backwards in Time', *Philosophy of Science*, 1981, p. 195.
46. *A Theory of Determinism: The Mind, Neuroscience and Life-Hopes*, or *Mind and Brain*, in both cases pp. 40-49.
47. Libet, 'Do We Have Free Will?', *Journal of Consciousness Studies*, 1999, reprinted in Libet, Anthony Freeman, and Keith Sutherland, eds., *The Volitional Brain: Towards a Neuroscience of Free Will* (Imprint Academic, 1999). What I have to say is based on this summary article, which is also reprinted in *The Oxford Handbook of Free Will* (Oxford University Press, 2002), edited by Robert Kane. The article contains references to various research reports.
48. 'Do We Have Free Will?', p. 49.
49. 'Do We Have Free Will?', p. 51.
50. 'Do We Have Free Will?', pp. 51-2.
51. 'Do We Have Free Will?', p. 53.
52. 'Do We Have Free Will?', p. 55.
53. 'Do We Have Free Will?', p. 56.

54. There is very effective criticism of several parts of the story by Al Mele in 'Decisions, Intentions, Urges and Free Will: Why Libet Has Not Shown What He Says He Has' mentioned above in footnote 2.

55. For a discussion of interactionism, see my *A Theory of Determinism: The Mind, Neuroscience and Life-Hopes*, or *Brain and Mind*, in both cases pp. 151-4, 161-3.

-----  
The piece is one of seven in *On Determinism and Freedom*, a collection of Ted Honderich's papers to be published by Edinburgh University Press.

-----  
[HOME](#) to Det & Free front page

[HOME](#) to T. H. front page