

Does the Brain Lead the Mind?

STORRS MCCALL

McGill University

Over the last 25 years, experimental findings published by Benjamin Libet have indicated that conscious acts of will are preceded by a characteristic kind of brain event of which the agent is not conscious. It, Libet says, rather than the will, is what causes actions. His discoveries, if correct, would seem to imply that the notion of a free, conscious will is an illusion, and that actions are initiated by neural processes not under conscious control. In what follows it is argued that Libet's conclusion is incorrect, and that other evidence points to the essential causal role of consciousness in voluntary action.

In Libet's experiment, subjects sat at a table in front of an oscilloscope "clock" on which a spot of light revolves around a circular dial divided into 60 sections (Libet (1999), p.50). The spot revolves once every 2.56 seconds. Subjects were asked to perform a simple flick of the wrist whenever they wanted, and to report the oscilloscope "clock time" *W* at which they were first aware of the wish or urge to perform the action. The oscilloscope clock had to be much faster than an ordinary clock, in order to show time differences of the order of a few milliseconds.

While the subjects were moving their wrists, and recording the times of their urges to do so, an EEG machine with electrodes attached to their scalp recorded brain activity, while an EMG (electromyogram) detected the exact activation time of the arm muscle above the wrist. When plotted on a single time chart, these various data revealed that the conscious wish or urge to move the wrist occurred about 200 ms. before muscle activation.¹ But the EEG also provided the unexpected result that a spike of cerebral neural activity, the "readiness potential" RP, occurred much earlier: 550 ms. before muscle activation and 350 ms. before *W*, the time of the conscious wish. In

¹ Critics have questioned the accuracy of Libet's method of timing the occurrence of *W*. Libet has replied at length: see in particular his BBS paper (1985), p. 532 and pp. 534-35.

Libet's experiments, readiness potentials are not recorded in the absence of a conscious wish. Nor do the data show them as occurring when a conscious urge to move the wrist is succeeded by an immediate conscious veto of that act after it is willed.² It would appear therefore that the unconscious physical readiness potential RP, rather than the conscious urge following it, is the true cause of action. In Libet's words, "the brain ... 'decides' to initiate or ... prepare to initiate the act ... before there is any reportable subjective awareness that such a decision has taken place."³ It would seem, accordingly, that the mind follows the brain, rather than the other way around.

Libet's conclusions have been welcomed by physicalists and materialists, who deny either that consciousness exists at all, or that it plays any causal role in the physical world.⁴ They have been disputed by others, notably by Mele, who makes the valid point that Libet's "readiness potential", occurring at 550 ms. before the time of the action A, should in no way be described as a *decision* or an *intention* to perform A. It could be described, Mele says, as an (unconscious) *urge* to flex the wrist, but as Mele points out, "having an urge" to do something is a long way from forming an explicit *intention* to do it, still less *deciding* to do it. In Mele's words:

"Nothing justifies the claim that what a subject becomes aware of at time W [the time at which subjects reported the "first awareness of the wish to act"] is a *decision* to flex that has already been made or an *intention* to flex that has already been acquired, as opposed, for example, to an *urge* to flex that has already arisen." (Mele (2006), p.40).

Mele's conclusion is that despite what Libet says, his experimental results leave it open that the subjects' flexing of their wrists may have been caused by an act of conscious will. In what follows I consider a different but similar situation, a real-life example in which the causal role of conscious will seems undeniable.

Imagine a heat of the 100 metre dash at the Olympic Games, an event where, as in Libet's experiment, every millisecond counts. The runners line up at the start. At "ready" they kneel in the starting blocks, at "set" they lift their knees from the track, and when the starter's pistol is fired they start. Unlike Libet's subjects they do not move their muscles any time they want, but strive to activate them, with explosive force, as soon as possible after the gun. Does conscious will play a key causal role in this process? It

² "In the absence of the muscle's electrical signal when being activated, there was no trigger to initiate the computer's recording of any RP that may have preceded the veto; thus, there were no *recorded* RPs with a vetoed intention to act" (Libet (1999), p. 52).

³ Libet, Gleason et al., in a 1983 contribution to the journal *Brain*, quoted in Al Mele, *Free Will and Luck* (2006), p. 33.

⁴ Daniel Dennett's *Consciousness Explained* (1991), and *Freedom Evolves* (2003), contain discussions of Libet's results.

would appear so: at least, no other causal explanation seems attractive. I consider three possibilities.

(1) A follower of Libet might suggest that EEG monitoring of the runners' brain activity would reveal an unconscious readiness potential RP in each case, occurring roughly 550 ms. before the initial muscle activation at the start. This RP would cause the runner to start running. But that seems highly implausible. How would a runner's brain be able to anticipate the firing of the starting pistol by 550 ms.? If the pistol failed to go off, would the runners start regardless?

(2) More plausible, perhaps, is the hypothesis that EEG monitoring would reveal the existence of a readiness potential RP in every runner's brain, but that the time of initiation of each RP before the start varied. Some RP's might commence a minute before the start, others only a few milliseconds. This I suppose is possible, but the absence of any fixed time at which a runner's RP would initiate muscle activation prevents hypothesis (2) from providing a true causal explanation. Why would such an RP initiate movement immediately after the gun, rather than before it, or at some other time?

(3) An alternative explanation of what happens at the starting line is that starting is a stimulus-response situation. When the runners hear the gun, they start. No conscious act of will is required. The runners with faster responses get ahead of those with slower responses. This explanation eliminates conscious will and conscious decision entirely, and no doubt would appeal to physicalists. But it cannot be right, for if it were there would be no false starts. False starts, in which the runner starts before the gun, are a recurrent nightmare for racers. The rules are very clear, two false starts and you're out. The stimulus-response explanation cannot explain false starts; it seems not unreasonable to think they are caused by the over-excited conscious state of the racer getting ahead of itself and issuing the command to start before it hears the gun.

The latter may sound like an over-anthropomorphized description of what is going on, and there may exist other theories of what false starts consist in. But I can't conceive of a theory of false starts that makes no essential reference to consciousness and acts of will. One could, perhaps, imagine a power of veto that the mind exercises over bodily movement until the instant the gun sounds. At that instant the veto is lifted, and the muscles

contract. But the question still arises, what lifts the veto? More significantly, what lifts the veto in some cases *before the gun fires*, resulting in a false start?

In view of (1)-(3) above, it would appear that the significance of Libet's readiness potential must be re-assessed. Instead of being the *cause* of the subjects' decision to move their wrists, I suggest it be understood as a *necessary condition* of the decision.⁵ If a readiness potential were detected in the case of competitors in the hundred meter dash, it could be interpreted as a necessary condition of their ability to start as soon as possible after the starting pistol: not a causally sufficient condition, but a necessary condition. Over and above the necessary condition of the readiness potential, which is physiological and unconscious, a conscious decision in the case of the starting pistol example would be needed for a full-blooded cause. Given this reinterpretation of the readiness potential, the natural thing to say is that Libet's experiment, and the starting pistol example, are instances of the mind leading the brain rather than vice versa.

References

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⁵ Mele (2009), p. 81, makes this suggestion. He points out that (1) "whenever you wiggle your finger, signal S appears a second before you wiggle it" does not entail (2) "whenever signal S appears, you wiggle your finger a second later". Buying a lottery ticket is a *causally necessary* condition of winning a prize, but it is not *causally sufficient*.