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IS FREE WILL AN ILLUSION?

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Abstract

Neuroethics is a burgeoning field of scientific–philosophical investigation that is becoming a genuine interdisciplinary area of study. This is because neuroscience offers a unique window into what it means to be human, explaining, at least to some extent, the important difference between the brain and the mind. Among the many fascinating topics in neuroethics is the neuroscience of free will and the nature of moral responsibility. Many contemporary philosophers are considered compatibilists, arguing that human beings are not truly free because their actions are completely determined by the material processes of the brain. However, if conscious willing is illusory or simply an epiphenomenon, both compatibilist and incompatibilist accounts of free will are erroneous. A great deal of scientific evidence and philosophical reflection suggest that, despite all the difficulties we experience in explaining free will, we do not unconsciously cause our actions.

Key words: neuroethics, free will, quantum mechanics, mental causation

Introduction

One of the more fascinating areas of study in neuroethics concerns the neurobiology of free will. Several neuroscientists claim that the experience of free will is just an epiphenomenal illusion, with underlying neural processes causally sufficient to explain the mental states that correspond with volitional action. Others contend that consciousness is simply the state neurons are in when a person is alert, with any temporal gap during the decision-making process reflecting the accompanying molecular activity located at lower levels of the brain. Personal experience suggests, however, that our states of mind are not completely determined by neural events. Indeed, material determinism fails to acknowledge the numinous qualities of the mind and thus threatens to change what it means to be human.

Here I speculate on the significance of the temporal gap separating pre-action neural activity from the conscious awareness of decisions to act, reviewing and critiquing Benjamin Libet's seminal studies in this area. Then I comment on the feasibility of recourse to quantum mechanics to explain the indeterminacy of free will, arguing that mental causation cannot be explained in exclusively physical terms. While external evidence provides ample proof of regularities or patterns in natural events, as well as predictability among the succession of events in nature, the causality associated with free will is unique. Since the top–down causation of free volitional activity cannot be fully explained in terms of material functionalism alone, we must invoke philosophical reflection on the nature of what it is to be human to explain free will.

Competing Philosophical Accounts of Free Will

Those who deny the existence of free will view human thoughts, desires, decisions, and intentions as causally impotent phenomena, even though our common appeal to moral

responsibility in societal life rules out material determinism *tout court*. In point of fact, if a person were not causally responsible for her actions, just about everything she believed about her as personal and free would be false.[1] In addition, the very idea that the future is completely predetermined by the laws of nature and assorted antecedent neural conditions is incompatible with the everyday experience of free will, an activity that enables us to choose between alternative possibilities and exercise control over our actions. So Thomas Nagel alleges that the only way to consider free agency properly is to see human action "as a basic mental or more accurately psychophysical category—reducible neither to physical nor to other mental terms."[2]

Authors who defend a compatibilist account of free will situate the psychological sensation of freedom in the matrix of material determinism. A typical compatibilist formula states that *x* chooses freely to φ if and only if the relevant antecedents of the choice leave the φ-ing up to *x*. To be more precise, an agent acts freely when she identifies with her motivational states in a reflective way and then endorses her desires and selected actions in the absence of external coercion. An interactive version of compatibilism maintains that the impersonal influences of the laws of nature, along with the agent's subjective beliefs and desires, allow for genuinely free choices and actions. Thus there is no need to frame free will in terms of substance (or property) dualism, sometimes referred to as libertarian or incompatibilist free will. The human being is not the union of two substances (like a rider and horse), or even the union of a man and an animal (such as the centaur).[3] Rather, she is a unified composite substance, somewhat analogous to wax and the shape given to it by a stamp.[4] Incompatibilist theories can be non-causal, event-causal, and agent-causal in kind. In the first case, intentional action begins *ex novo* with a basic mental action or desire. The event-causal account allows for a modicum of agent control, good reasons for acting, and the possibility of not performing a proposed action. And the agent-causal view denies that free acts can be reduced to events, since agents can give reasons to explain why they acted in a certain way, even though reasons are not the actual cause of free actions.[5]

The literature in the area of cognitive neuroscience is truly immense, and I do not pretend to be able to summarize it in such a brief essay. My approach to the topic will therefore be quite selective and limited. First, I review the groundbreaking experiments of Benjamin Libet on the so-called Readiness Potential, which supposedly demonstrates that subconscious mental states control volitional action. In this connection, I point out some interpretative problems with Libet's data and propose alternative ways of understanding his findings. Second, I discuss some problems with a reductionist concept of functional brain activity in which mental states are deemed to be nothing more than mechanistic, lower-level, molecular operations that cause what appear to be free acts. Third, I rehearse what proponents of quantum physical theory propose may be going on at the subatomic level in living organisms—a randomness and probability that allows for the presence of free will in human beings. Then I outline various views of top–down mental causation, suggesting that some but not all of them are useful for explaining free will. Finally, I describe the relation between free will and natural causality, offering a novel way of depicting personal agency in the context of lower-level molecular activity.

Free Will and the Readiness Potential

Libet found that when subjects were asked to flick their wrist as soon as they noticed a fast-moving dot of light arcing across the face of a clock, a negative electrophysiological potential appeared at the vertex of the scalp *before* conscious awareness of the decision to act. Libet called this the "readiness potential" (RP), borrowing the expression from Hans Kornhuber and Lüder Deecke.[6] The RP appears 550–700 milliseconds (ms) prior to electromyographic activity (EMG), whereas conscious awareness of the urge to move takes place around 200–300 ms before the EMG. Since an experimental subject only realizes her decision to act *after* the RP spike, Libet concluded that a person is merely informed about a subconscious decision to act and is not directly involved in making that decision. Of equal interest, the will can intervene prior to executing a motor act, allowing for a conscious veto of the proposed action. For Libet, this meant that conscious free will is limited to controlling whether a voluntary act occurs, with its initiation following a "bubbling up" of unconscious initiatives in the brain and the conscious will simply selecting which conceivable action(s) to perform.[7]

Several alternative interpretations of this data have been offered since then, including the possibility of potential report biases. For instance, when participants are asked to identify the location of a moving dot on a computer screen, respondents tend to project its path farther along the dot's trajectory and overestimate its final position.[8] What is more, awareness time varies as a function of clock speed, with responses shifted forward in time at higher clock speeds. If these experiments were repeated at different clock speeds, the time differences between the onset of the RP, subject awareness of the intention to move, and the onset of movement would probably differ from Libet's original results.[9] Further, the exogenous stimulus control Libet employed in these experiments is suspect because exogenous and endogenous stimuli are qualitatively distinct.[10]

One could argue that the electrophysical cerebral activity preceding conscious awareness is precisely what we would expect to see before volitional actions, with the variation in mental processing correlated with the complexity of the task at hand. In Libet's experiments, subject reports about the intention to act concerned well-rehearsed rote responses, representing the general states of arousal or the preliminary motor information needed to prepare for a predetermined movement. In fact, conscious awareness depends on antecedent cerebral preparation, and this subliminal neural activity is often unconscious.[11] Since more complex volitional actions require additional time to process, the simple voluntary movement used in Libet's experiments is not suitable for evaluating an intentional movement driven by complex conscious decisions.[12] The experimental subjects may have actually wondered whether they were experiencing an urge to act, a thought about when to act, or an anticipation of acting in the near future.[13] Given the fact that subjects were instructed in advance *not* to flex their fingers, they did not actually veto an *intended* motor action but performed a prearranged abortive act.[14]

On balance, then, Libet's studies may have had little to do with intention awareness as such. On the contrary, test persons were simply instructed to introspectively monitor an internal trigger, which could have been nothing more than the *sensation* of an ambiguous threshold of muscle tension induced by an anticipated action. The half-second lag-time between the onset of the RP and awareness of an intention to act reflects the interval of precursory neuromuscular activity preceding pre-determined modes of

acting, and a purposive causal agent represents possible courses of action to herself only when there is more at stake.[15] On this point Robert Sokolowski writes:

> In making a choice, I must distinguish sharply between the purpose I seek and the action I now perform; I must articulate a whole into discrete and heterogeneous parts; I must recognize the parts as parts, and I must concomitantly hold all those parts together in an articulated and synoptic whole—the whole that is governed by the purpose and populated by its intermediary steps.[16]

Rational self-determination entails the capacity to reflect on reasons for acting, being willing to revise one's entertained desires in light of critical normative reflection. It seems possible that Libet confused the conscious decision to act with the state of the brain *by means of which* one becomes aware of a decision to act. Also, because his subjects were *conscious* of what to do, they may have (unconsciously) delegated the initiation of requested tasks to sub-personal mechanisms capable of rapid responses.[17]

Materialism and Functional Brain Activity

Just as we do not blame a clock for telling the wrong time but look to the clockmaker or the clock-reader for the fault, unconscious neural activity alone does not appear to be responsible for aberrant moral behavior. Part of the problem with Libet's interpretation is his working premise: that materialism is self-evidently true. Functional dependence is not the same thing as ontological identity, and the fact that brain activity is necessary for mental acts does not necessarily mean these two activities are equivalent.[18] This distinction becomes clearer when we consider the qualitative aspects of phenomenal consciousness, or qualia, which defy reduction to matter and do not always correlate well with functional states and subjective experiences.

> We all have a grasp of the subjective or phenomenal character of such states as the visual experience of orange, the feeling of anger, the sensation of being about to sneeze. Our grasp of what it is like to undergo these and other experiential states is supplied to us by introspection. We also have a grasp, albeit an incomplete one, of what goes on objectively in the brain and the body. But there is, it seems, a vast chasm between the two.[19]

Emotions play an important role in ethical thinking as well, and certain molecular changes correlate with diseased psychological states. Consider the emotional apparatus of the psychopath, who is irresponsible in behavior and indifferent toward others. Scientific evidence indicates that the amygdala, a brain structure that propagates the aversive emotions of fear and anxiety, is compromised in people with this personality disorder. Functional magnetic imaging (fMRI) demonstrates a correlation between reduced amygdala response and high scores on Hare's revised Psychopathy Checklist, and neuropsychological studies show that the orbito-frontal cortex may also be involved.[20]

While high-resolution brain scans provide a refined mapping of the neural substrate of the mind, this cerebral "blueprint" is not reducible to the mind's functional features, for the human intellect possesses qualitatively novel properties that are not exhibited by the physical properties of the brain. Nonetheless, Michael Gazzaniga still claims that neuroimaging data enables us "to read" human intentions: "there could be a universal set of biological responses to moral dilemmas, a sort of ethics, built into

our brains."[21] In reality, the voxels that constitute a brain scan represent the shape of what *is*, not what *ought* to be done. Furthermore, real-time fMRI brain scans are not a visual representation of thought but digital displays of material activity that precedes and accompanies conceptual thought. So even though fMRI studies have been used to analyze preferences, altruism, social cooperation, and the intention to deceive or lie, their practical value concerning free ethical behavior is uncertain at best.[22]

Quantum Physics and Free Will

John Searle believes that quantum physical theory enables us to elaborate an event-causal account of free will because it employs probabilities to describe the random behavior of sub-atomic particles. On this reading, higher organizational structures emerge from random, lower-order, molecular activity in predictable ways.[23] Jaegwon Kim, by contrast, argues that the novel properties arising from basic material particles completely transcend their constituent properties, and the laws governing simpler systems have no predictive value with respect to emergent properties. Indeed, many physical phenomena are independent of predictable fundamental laws, with complex organizational structures and activities acquiring an identity that rises above the parts from which they are composed.[24]

Here it is interesting to point out that the Hodgkin-Huxley equations that describe neural impulses cannot simply be reduced to the laws of physics. These equations depend upon the organization of proteins that mediate the potassium and sodium current across axon membranes as well as the geometric structure of the nerve fibers, giving rise to new laws that govern the dynamic activity of nerve impulses at a higher level of functionality than physics or chemistry. What warrant, then, do we have to assume that human behavior is derivable from neurobiological laws rather than some higher-level organizing/action-selecting principle?[25] Although top–down agent causation must be related to the indeterminist micro-level laws of nature, an agent's causal power has to be different *in kind* from the events that go to shape that power. Consider the fact that a headache causes me to desire pain-relief. While the sensation of pain and the wish for its alleviation are determined by distinct brain states, emergence of the desire for pain relief requires an additional causal influence: *I must decide* to take an aspirin to obtain pain relief.[26] For all intents and purposes, an agent-causal account of free will rules out the possibility that we merely experience the voluntary actions we perform.

Yet another problem with recourse to quantum mechanics to explicate free agency is the fact that material randomness is insignificant in larger physical systems like the brain. So, even if sub-atomic indeterminacy did affect matter on the macroscopic level, an apparently intractable dilemma still remains. "If I am not free, despite the fact that I can do what I want when I want, how does the fact that sometimes – due to a random event – I *fail* to do what I want when I want to enhance my freedom?"[27] In short, the indeterminacy of sub-atomic phenomena would *reduce* my freedom, and free choices would not be under the agent's control. As J. J. C. Smart quips: "I would feel that my freedom was impaired if I thought that a quantum mechanical trigger in my brain might cause me to leap into the garden and eat a slug."[28]

A further difficulty arises when authors fail to distinguish between biological predispositions and free choice, what scholastic authors used to call the *voluntas ut*

natura and *voluntas ut ratio.* Patricia Churchland, for instance, does not differentiate between involuntary neural seizures and voluntary abusive behavior in discussing the correlation between material and volitional activities:

> Imaging techniques (functional MRI) showing unusually low levels of activity in the orbital cortex can help us predict that a person is depressed. If a person has a mutation in the gene that normally produces the enzyme mono-amino oxidase A (MAOA), and if he has also had an abusive upbringing, we can reliably predict that he will display irrationally violent and self-destructive behavior. An electroencephalogram (EEG) in which electrodes are placed on the scalp, can detect brain changes that predict the imminent onset of an epileptic seizure.[29]

On this score, Walter Glannon reminds us that we hold people responsible for their behavior, not their brains or minds. "We hold persons responsible on the basis of the mental states that issue in their actions, and these states are generated and sustained by the brain. But the content of those mental states, the external events to which they are directed, cannot be explained entirely by reference to their neural correlates."[30]

Actually, deterministic neuroscientific explanations are relevant when we have reason to believe behavior is unintentional or irrational, and this is especially true when a person entertains an *ersatz* conviction. A person with the paranoid belief that an alien from Mars is pursuing him may act in bizarre ways, such as hiding behind a bush when approached by a stranger. Evidently, this is not a rational action, for the content of the belief is clearly false.[31] Even if there is a definite correlation between neurophysical and psychological states, that association cannot tell us how a neurophysical state relates to a good act or a positive psychological state.[32] Interestingly in this regard, Martin Heisenberg claims that *intrinsic* behavioral modules functioning independently from sensory input are a sign of free will, and the activation of these modules is based on an intricate interplay between chance and the cerebral laws of nature. Then again, the very examples Heisenberg provides, such as the grasp reflex of a baby, undermine this interpretation, for reflexes are involuntary reactions to something external to the agent.[33]

These considerations indicate that if the choices we make were strictly indeterminate, free acts would just be random, arbitrary, capricious, and totally inexplicable. One possible way to describe downward causation in terms of quantum states is to envisage a broader high-level system influencing the otherwise indeterminate events at the quantum level. George Ellis, for example, contends that the constituent particles at the micro-level, albeit devoid of individual properties as such, are influenced by extrinsic factors that modify their native indeterminacy and give rise to "entangled states" that would allow for the emergence of free will. In consequence, besides possible cooperative effects among the constituent parts themselves, top–down causality could confer a certain order on the underlying elementary particles.[34]

Top–Down Mental Causation

When someone deliberates over what to do in a particular situation, she usually elaborates reasons to explain her final decision. If there is no time to consciously deliberate, the person may not be fully aware of the reasons she chose a particular action. Moreover, many habitual ways of acting are explained *after* the fact, either in order to

assuage one's conscience or to justify the chosen behavior to others. This does not mean that agent causality can simply be reduced to the order of material causality, however.

> Suppose an apple falls on the table before me, and I ask the question "Why?" The right way to answer is by citing a cause: it fell because the breeze dislodged it. By giving causal explanations, we are automatically ordering events in space and time, and the causal relation itself is intrinsically temporal. But suppose that you throw an apple onto the table before me, and I ask the question "Why?" The question now has quite another sense. In the normal case – that is, the case where it is not asked *of* you, but addressed *to* you – the question looks for a justifying reason, not a cause. Why should you throw this apple down before me? The answer might be that I deserve it, or that it would be good to eat.[35]

If an agent employs efficient causality to bring about an action that transcends material causation and requires a reason to be fully explained, we cannot conclude that conscious mental states are merely higher-level system features of the brain. The agent must cause her free actions, even if reasons as such are not causative. And while beliefs and desires explain why an agent acts, she must exercise a distinctive executive power in order to act, and the operations of this power are not fixed by prior physical events.

When a human being acts in a fully rational way, she chooses an action in light of beliefs and desires, even though she is not caused to act by those beliefs and desires. This is most evident when a person weighs the pros and cons of different courses of action, evaluating the various *reasons* for acting one way or another. The vying reasons do not sort themselves out on their own, of course, nor does any one set of reasons cause the final chosen action to take place. Also, the fact that a choice is not determined by prior events or by certain mental states does not mean it is an arbitrary occurrence, for one chooses among assorted sources of evidence to deliberate with— reasons for or against the contemplated action— and then determines how to direct her thoughts. Once a specific course of action is decided upon, she moves her body to obtain the desired end. Does this mean free will is a quasi-divine attribute? Roderick Chisholm has led some readers to think so: "each of us, when we act, is a prime mover unmoved."[36] Owen Flanagan's allegation that Chisholm advocates God-like creative abilities *ex nihilo* is a rhetorical ruse, yet he is surely correct to ask how free will could be embedded in the context of material causation. "We think of free actions as unforced, as not involving compulsion to do what we don't want to do, but that is very different from thinking that free actions occur with no constraints or totally outside the causal nexus."[37]

An agent-causal theory of action holds that the acting subject normally has an intention in mind with pertinent content and that the exercise of active control over personal actions is a causal phenomenon. Jonah Lehrer neglects this key aspect of decision-making in discussing how a naval officer decided to shoot down an unidentified flying object that threatened a Coalition battleship during the Persian Gulf War. The radar operator recognized something unusual about a blip on the radar screen, and this anomaly led him to infer that he was seeing an incoming Iraqi missile. Lehrer explains this by saying that dopaminergic neural cell firing altered in response to an unusual radar pattern.[38] But, as Richard Taylor explains, something more is at work in such situations.

> If I believe that something not identical to myself was the cause of my behavior—some event wholly external to myself, for instance, or even one internal to myself, such as a nerve impulse, volition, etc.—then I cannot regard the behavior as being an act of mine, unless I further believed that I was the cause of that external or internal event.[39]

Agents possess an active power in virtue of a particular set of natural properties that contribute to their causal powers in a way that differs from and transcends simple event-causation. Even if macro-properties do emerge from the microstructure of the brain, reasons for acting are not causal in the usual sense of the term. As Timothy O'Connor puts it, "*I* produce my decision *in view of* those reasons, and could have, in an unconditional sense, decided differently."[40] In other words, we have the power to cause an effect or to *refrain* from causing it, and this power reflects the fact that reasons are not causes when they are not heeded.

Nancey Murphy alleges that a person's ability to subjugate behavior to the dictates of reason reflects the higher human capacity to evaluate prospective actions and to act for abstract ideas like justice, and this mental mechanism can be explained by adopting a non-reductive, physicalist view of agent autonomy.

> My recommendation is to say that when a person acts on the basis of considered goals and principles, without undue biological or social interference, she has become the author of her own acts and ought to be described as acting freely. This again, is free will understood as autonomy, but without the unrealistic expectation of total autonomy.[41]

Murphy speculates that the dynamic neurobiological system acts as a downward cause by *constraining* or *selecting* lower-level parts of the body's constituent functional parts. This explanation of human free will is somewhat suspect, however, for its principal aim is to preserve traditional concepts of moral responsibility and associated social practices.[42]

David Chalmers alleges that, even if the physical world is causally closed, conscious awareness and deliberative operations could supervene on the physical in a *natural* way, with supplementary properties being described with psychophysical laws.[43] Interesting in this regard, there is empirical evidence of downward mental–physical causation in certain psychiatric states. PET scans reveal that special cognitive therapy in individuals with Obsessive Compulsive Disorder alters the physical structure of neural circuitry, indicating that our minds do influence the physical structures of the brain.[44] In light of these empirical findings, John Haldane's portrayal of the human being as a psychophysical substance is intriguing. Just as the formal structure of an object is communicated to the senses and then to the intellect in knowledge acquisition, a person's intentions may *inform* or *structure* her desired action by means of the efficient causality of matter. On this interpretation, there are hierarchies of organizational complexity in the brain, with various levels of structuring principles subsumed under a single psycho-physical form. This depiction of the mind–body relation agrees with the observation that all biological entities have an organizing principle of some kind, with each of the non-substantial parts structured in a definite way by that principle.[45] And if the mind shapes the body and its functions in both intentional and volitional terms, it is not an added attribute but *the*

defining principle of a human being.[46] So the brain may not be simply the integrator of various body systems but the *modulator* of a pre-existing somatic unity.[47]

Some formal structural ordering is required in material causation as well, for efficient causality alone neither implies determination nor excludes randomness, and the presence of such reliable patterns are of critical importance in scientific research. Indeed, it is the patterns of regularity in nature that make scientific inquiry possible, for only then can a scientist legitimately assume (and predict) that this regularity will remain in the future.[48] The convergences we observe in biological organisms are quite remarkable, something akin to ripples of water converging on a central point in a pond rather than diverging from the central point of propagation. Furthermore, in view of the fact that time-reversed backward causation is impossible in rational human beings, the mind must impose patterns of activity on the brain based on deliberative volitions.[49]

Natural Causality and Free Will

Daniel Wegner alleges that the conscious thoughts which come to mind prior to acting are mere *previews* of possible actions, and these mental representations rise to the level of consciousness as the end-result of unconscious processes. Free will is therefore just "a conscious experience that may only map rather weakly, or perhaps not at all, onto the actual causal relationship between the person's cognition and action."[50] Despite the fact that we experience ourselves as making conscious decisions, intending specific ends, and acting in particular ways, the impression that a particular thought causes a specific action is based on inferences, and such judgments are always open to question. In support of this opinion, Wegner cites the movements of the planchette on an ouija board, table turning, automatic writing, and pendulum divining. But, as Roger Scruton reminds us, we must ask the right kind of question in cases of this kind.

> When the judge asks me why I put arsenic in my wife's tea, he will not be satisfied by the response, "[b]ecause electrical impulses from my brain caused my hand to reach for the bottle and tip it into the waiting teacup", although that may be a true answer to the question "why?" construed as scientists construe it, as a request for the cause. For it is an answer *of the wrong kind*. My original answer to the judge was absurd not because it was false but because it removed my action from the sphere of judgment and described it in terms that make no reference to it as *mine*.[51]

Simple rote tasks often involve unreflective decision-making processes, such as which hand I use to answer the telephone, or the exact phrase I use to ask for a cup of coffee. All the same, if you put your mind to it, it is possible to control some unconscious actions, such as learning to voluntarily control heart rate and blood pressure. One can also learn to direct thoughts in positive ways in order to avert obsessive patterns of cognition, manage panic attacks, and ward off bouts of depression.[52] And the capacity for off-line action simulations or rehearsed behavioral scenarios indicates that the person *as a whole* is an agent of thought and action, not some fictive inner self located inside the brain.[53]

Harry Frankfurt distinguishes self-reflective free will from freedom of action, with second-order desires enabling a person to reflect critically upon spontaneous impulses and wishes by forming second-order volitions that can modify her valuation of goods and redirect self-chosen goals. Lynne Rudder Baker bases her compatibilist explanation

of moral responsibility on Frankfurt's hierarchical concept of the will. If an agent is able to conceive her desires as truly her own, she cannot be the mere conduit of deterministic forces beyond her control. After all, this person produces intentions that shape the causes of what is done by modifying her first-order desires.[54] Clearly, this kind of mental reflection is not always operative, as many routine actions align themselves with one's general view of life, being second nature and pre-determined to some extent. And so the very process of deliberation is indicative of immaterial mental activity, since it concerns general descriptions of possible events. Moreover, we learn general concepts and terms from others, and these transcend purely material or physical configurations in space and time, not being an instance of efficient causation per se.[55]

All things considered, explaining the compatibility of free will with the regnant scientific theory of material determinism appears insoluble, primarily because compatibilist accounts of the mind–brain relation reduce intellectual and volitional activities to epiphenomena. Allen Wood explains the problem in this way:"The basic objection to compatibilism is that if we are nothing but a product of our physiology plus external causal influences, then we cannot possibly be the sort of beings who could be the cause of our own actions entirely from ourselves – that is, freely."[56] Flanagan's neo-compatibilist version of free will is not completely convincing either, for he fails to reconcile free will with natural causality, even openly admitting that his proposal is a purely naturalistic account of volition. While common sense notions of free will demand more than compatibilist interpretations of freedom can provide, at least these notions respect the complexity of the psychological and rational processes we experience. Actually, the advocates of an inter-actionist concept of freedom gain some empirical support from Libet's experimental findings, if not his interpretations of the same, because the conscious mental event of a decision to act in a specific way coordinates several mutually independent neural events that induce a specific pattern of activity.[57]

Conclusion

In bringing these various considerations to a close, it is important to recognize that a search for the neural correlates of consciousness assumes that the brain is the sole source of all mental activity— an assumption that has led several cognitive neurobiologists to abandon a global vision of self-consciousness. A critical step forward in this field would entail elaborating a unitary or holistic explanation of brain function and mental activity. Free action does not necessarily demand the suspension of natural laws or quasi-deterministic material processes, even though it does require the personal intervention of an agent. Whenever a human being acts, he or she intervenes in a causal sequence of events that could have yielded a different result from that which came to pass.

> When I decide to blink my eyelid rapidly, I am intervening into the biological or physiological "laws" that normally cause my eyelid to blink according to a particular organic regularity. My intervention into the organic regularity has the effect of making the eyelid blink faster or slower than it normally would without the intervention. In so intervening, I am not violating the laws of nature, but I am utilizing and deploying them in accordance with my overarching intention. But at no point is my action capable of successful completion in the total absence of the structures of organic, physical reality. Action supervenes on nature but cannot occur in its absence.[58]

The action of an intentional, self-guided, purposive agent cannot be reduced to material phenomena alone. A higher-level organizing principle must be at work, conferring unity, structural order, and purposive agency to the entire organism. And this necessarily entails something more than 'editing' the products of direct physical causation.[59] The all-encompassing agent is inclusive and imparts order, 'reaching down' as it were, through its myriad chemical and physical structures, in order to deploy that infrastructure to carry out the intended purpose.

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