Philosophical Materialism

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Materialism is the oldest philosophical tradition in Western civilization. Originated by a series of pre-Socratic Greek philosophers in the 6th and 5th centuries before the Christian era, it reached its full classical form in the atomism of Democritus and Epicurus in the 4th century BCE. Epicurus argued that ultimate reality consisted of invisible and indivisible bits of free-falling matter called atoms randomly colliding in the void. It was on this atomic hypothesis that the Roman poet Lucretius wrote the first masterpiece of materialist literature around 50 BCE, the 7400-line philosophical poem *De Rerum Natura*, or, as it's usually translated, *The Nature of Things*.

Already in Lucretius' great poem we can see one of the hallmarks that distinguishes materialism from every other comprehensive philosophy produced by European civilization before the 20th century: its insistence on direct observation of nature and on explaining everything that happens in the world in terms of the laws of nature. In other words, from the beginning materialists have always based their theory on the best scientific evidence at hand, rather than on some putative "first philosophy" waiting to be discovered through abstract philosophical reasoning.

The tendency is clear in the second masterpiece of materialist literature, Baron Paul d'Holbach's anonymously published *La Systeme de la Nature* (*The System of Nature*), which appeared in France in 1770 and was promptly condemned by Louis 16th's government. This meant that the official state hangman was authorized to ferret out every copy of the book and have it literally cut to pieces on a beheading block. D'Holbach bases his mechanical determinism on Newtonian physics and Lockeian psychology, arguing that every event in nature, including all human thought and moral action, is the result of an inexorable chain of causation rooted in the flux of atomic motion. Like Lucretius, he insists there is no reality other than matter moving in space, as Newton theo-

rized in his laws of motion and gravity. D'Holbach also attributes all thought to images impressed on the mind's *tabula rasa*, or blank slate, in wholly mechanical fashion according to these same laws of motion, as Locke had argued.

So too with the third pre-20th-century masterpiece of materialist literature, Ludwig Buechner's 1884 edition of *Kraft und Stoff*, translated *Force and Matter*, one of the most widely read and influential German books of the 19th century. Himself trained as a scientist, Buechner, like Lucretius and d'Holbach, saturated *Force and Matter* with the best science of his day, including cutting-edge theories and discoveries in physics, chemistry, geology, and biology, which of course incorporated Darwin's recently published theory of evolution.

Yet neither Lucretius, d'Holbach, nor Buechner claimed that materialist philosophy was an empirical science. They all realized it rested on assumptions that were ultimately *meta*scientific, though never meta*physical* in the Aristotelian sense. That is, the assumptions of materialism reached *beyond* empirical science, though never beyond *physical reality*. These metascientific assumptions were, first of all, that material or natural reality formed an unbroken material continuum that was eternal and infinite[1]. Nature had no beginning or end. It was an eternal, self-generating and self-sustaining material fact without any sort of barrier or limit zoning it off from a nonmaterial, non-physical, or supernatural type of being. The only foundational being there was, was material being, and some kind of natural substance underlay all visible phenomena. Lucretius called this endless fact of material being the "All," and with d'Holbach and Buechner concluded it lacked any plan or purpose and consisted of blindly opposing forces locked in an ultimately self-canceling, cosmic equipoise or gridlock.

Of course these assumptions implied, secondly, the lack of any governance or management of the universe by any sort of transcendental intelligence. From the start, materialism has been implicitly atheistic, though its atheistic implications were not fully spelled out before d'Holbach did so in his *System*. Materialism has always viewed atheism merely as a necessary consequence of its premises, not as a philosophically important end in itself. Supernatural gods, spiritual deities, or immaterial moralizers could obviously not be taken seriously, or for that matter even imagined to exist, in the materialist hypothesis.

Thirdly and last, materialism has always assumed that life is wholly the product of natural processes. All human thought and feeling emerges from the nonliving, inorganic matrix of physical nature and ends at death. Lucretius believed that thoughts and feelings were literally made up of a film of very fine atoms that peeled away from objects and recombined in the brain. D'Holbach believed that thoughts and feelings were the end product of chains of physical causation rooted in atomic motion. Buechner believed that thoughts and feelings were electrical impulses somehow shaped by the human nervous system into coherent patterns. Moreover, though it's not widely known, Lucretius and d'Holbach both theorized that organic life evolved from inorganic matter, though it was not until Buechner's championing of Darwinian theory that materialism could justify the theory scientifically.

So materialism has always inferred its theories from the best empirical evidence at hand and has as a result always had its metascientific hypotheses scientifically confirmed, because the basic assumption of valid science has also always been that nature is governed by coherent, discoverable physical laws. Indeed, the triumphs of science in the 20th century have been so stunning that today a majority of professional philosophers, at least in the English-speaking world, identify themselves as materialists of one kind or another[2]. Because these contemporary materialists disagree on some issues, I'd like to introduce you to modern materialism this evening by explaining some of its main concepts and controversies.

When someone today describes himself or herself as a materialist, they generally mean they stand somewhere in a spectrum defined at one end as reductive materialism[3] and at the other end as eliminative materialism[4]. Reductive and eliminative materialism[5] describe the poles of the process known as intertheoretic reduction. Intertheoretic reduction[6] refers to what happens when a new scientific theory either better explains or else completely invalidates an existing scientific theory. If the new theory better explains the old one, it is said to have reduced it to a fuller, more convincing explanation. A successful reduction of this kind was the incorporation and clarification of Newton's laws of motion in Einstein's theory of relativity, or of Maxwell's laws of electromagnetism in quantum theory.

The other pole of intertheoretic reduction, eliminative materialism, consists of the invalidation or complete displacement of an earlier theory by a new one. Examples of this

kind of elimination are: the theory of demonic possession being eliminated by the theory of mental disease, the theory of phlogiston being eliminated by the discovery of oxygen as the cause of combustion, or creationism being eliminated by evolution as an explanation of the earth's history.

Obviously, modern reductive and eliminative materialists are allies in believing, as pre-20th century materialists did, that science has always confirmed and will most probably always continue to confirm the basic hypotheses of materialist philosophy: that is, first, that all reality is essentially a material reality and that therefore, second, no supernatural or immaterial reality can exist; and, third, that all organic life arises from and returns to inorganic matter. Their main disagreement is over the mind-brain problem, which has been the focus of 20th century materialist debate.

The so-called mind-brain problem refers to the question of whether or not human consciousness is reducible in all respects to scientific laws. In the 1960s and 1970s those materialists who said it is, known as identity theorists (i.e. the mind is identical to the brain in all respects), were challenged by other materialists known as property dualists[7], functionalists[8], or supervenience[9] theorists. What all of these challengers had in common was a belief that in some way human consciousness was irreducible to or inexplicable in terms of natural processes[10]. They held, for example, that so-called *qualia* -- a person's experience of pain or of after-images of color, for example -- were unique to that person and incommunicable and unknowable to any one else. They argued further that such properties of consciousness as *qualia* could not be translated into the terms of physical science in any meaningful way and hence represented a reality not amenable to the laws of nature.

Moreover, these challengers doubted the reducibility of one person's consciousness to the same series of physical events as that which underlay another person's consciousness, even though both consciousnesses might depend on, or, in current philosophical jargon, be supervenient on, physical events happening in each brain. Two different brains did not have to work exactly the same way, much less intelligences that might be silicon-based rather than biologically-based but capable of sharing thoughts or feelings with biological brains. The fact that the same mental experience might be physically realized in different ways in two different biological or non-biological brains limited the identity of mind and brain to at most a token identity[11] between a specific brain and

its unique mental experience. It invalidated broad, "type" identities between mental experiences and brain processes in general.

To these objections, current eliminative and reductive materialists make the following reply. First of all, they argue that *qualia*, or the private feels of one's own experience, are no more incorrigible -- no more infallibly known by the individual -- than one's experience of the external world[12]. One's body and brain is just as likely to misrepresent internal as external experience. Pain can be anaesthetized and disappear, even though the same knife continues to cut your skin. One can hallucinate colors privately as well as publicly, and in fact the brain's moment-to-moment reconstruction of the external world is arguably just as private an experience as that of one's *qualia*, yet no one claims one's knowledge of the external world is infallible or incorrigible.

Secondly, a token identity between mental events and brain events is all that is needed for a robust and defensible mind-brain reductionism. No reductive materialist needs to claim that every brain works precisely the same way when it sees a tree, multiplies 2 times 2, or hears a Beethoven symphony. All that is needed is a convincing theory of how brains in *general* succeed in producing what we call consciousness from their visceral pulps and fluids. Since how the brain actually works is today one of the least-understood and most hotly-debated subjects in science, I'd like to explain briefly the most promising of these theories and in the process finish my discussion of philosophical materialism.

Neuroscience has concluded that the firing, or spiking, of cells in the brain known as neurons is the foundation of all brain functioning. Every brain has billions of these neurons, joined together in billions of networks by tiny filaments called dendrites and axons. Incoming signals, in the form of tiny electrical impulses generated by other neurons, pass down the dendrites to circuit-breaker-like gaps around the neuron known as synapses, which chemically monitor all the incoming signals and, when all the signals have reached the appropriate level, suddenly depolarize the electric differential outside and inside the neuron and cause the neuron to fire, or spike. The neuron's fired or spiked signal is then communicated to other neurons in the network down its axons. It takes roughly a hundredth of a second for a neuron to spike and repolarize for a new spike, which means that a neuron can fire at most a hundred times a second -- far too slow to complete the incredibly complex tasks the brain can do almost instantly, like rec-

ognizing someone's face, identifying a note or two or music as part of a song or symphony, or picking up a glass from a table.

This means that the brain is confined to what is known as the "hundred-step rule," or the fact that the maximum number of sequential steps the brain can take in one second is about a hundred. Since high-powered digital computers (computers that do all their computations sequentially, like a herd of sheep passing one by one through a gate) can do millions of steps in a second yet are notoriously poor at doing the perceptual and discriminatory tasks brains do with ease, the brain, it is theorized, is not structured like a linear computer but like a vast number of multi-dimensional computers working in parallel with each other.

In what sense is the brain a "multi-dimensional" computer? At bottom, the brain evidently works on the same on-off, binary principle that governs all linear computers: like them, its basic language is either "on" or "off" -- either spike/fire or not spike/fire. When a neuron spikes or fires, it does so in mechanical, all-or-nothing fashion like a spark plug, entirely as a result of having reached just the level of electrical excitation in its synapses it needs to make it suddenly depolarize. By themselves, neurons are nothing but stupid, mechanically controlled switches.

But when they are joined in networks whose signals parallel those of billions of other networks and interact at critical points, the result is human consciousness. From a countless plethora of dumb, electrical relay switches and settings emerges the amazing phenomenon we call human consciousness and intentionality -- the ability to think about things, to feel a range of emotions, and to realize one's self as a subjective entity distinct from the rest of the world.

How can this happen? How can something oblivious of the world become conscious of the world? Though theoretical neuroscience is still in its infancy, furiously boiling with new ideas, some likely answers are emerging from the steam. One promising theory is that networks of neurons in the brain consist of subsidiary groups of neurons or even individual neurons that serve as the axes of a multi-dimensional system of coordinates that can mathematically translate one kind of value to another kind of value. For example, someone sees an apple hanging from a tree. His brain locates the apple in an abstract visual space calculated in terms of how many degrees above a distant horizon the

apple is, how close to him the focusing of his eyes tells him the apple is, and so on. But in order to pick the apple, his brain must translate its abstract visual calculation of the apple's location into an abstract motor-muscular space which will tell the muscles of his arm at which angle they will have to set themselves in order to approach the apple. What happens here, it is theorized, is that an array of neuronal networks transforms the values of his visual space into those of his motor space by means of a mathematical tensor, or formula, that translates the multi-dimensional coordinates, or vectors, of visual space into the vectors of motor space -- all the angles of sight are translated into angles of arm-bending. Although it does not seem so to the person reaching for the apple, his behavior is the result of a vast number of mathematical computations in his brain, which, because of its parallel computing capacity, it is able to carry out almost instantly.

Moreover, one of the brain's most impressive powers is that it is incredibly plastic and capable of learning, especially in infancy and childhood. It may well learn by adjusting the synaptic openings, or weightings, as they are called, of neurons individually and in networks so that the signals reaching them must produce just the right polarity from just the right dendrites to fire. This could explain, for example, why we recognize faces and other hard-to-distinguish sense experiences so quickly. Our brain has so many neuronal networks available for use -- one researcher has calculated them as totaling more than 10 to the 80th power -- that every single thing we learn may have its own network set at just the right synaptic weightings to be activated only by that bit of learning. This means that impulses coming into the brain from the senses are blocked from activating all but the relevant network, which almost instantly verifies that it's granny's face at the door. And synaptic weightings are flexible enough to readjust to changing circumstances if necessary.

The bottom line of this theoretical approach, of course, is that the mind is reducible to natural processes that can be translated into the language of math and physics. Neuronal networks are computing mechanisms that effortlessly transform multi-dimensional vectors of one kind of mathematical value into other vectors of mathematical value. Visual space being changed into motor space has been mentioned, but a great deal of work has already also been done along these lines on how we see and hear. Images from the eyes' retinas are translated into neuronal signals and processed through countless neural networks simultaneously so quickly that it seems to the viewer she is seeing the

external world on a mirror in her mind, whereas in fact her brain is recreating and re-representing everything "out there" from, as it were, scratch. So too with sound. Varying air pressures entering the ear are translated into electrical impulses which are then massively and instantly parallel-processed into noises that seem to be coming to us, direct and unmediated, from the external world. But in fact they too, like our vision, are the result of incredibly complex processes of vector transformation among multi-dimensional coordinate systems performed by the countless neural networks of our brain.

Most reductive and eliminative materialists agree that the theory of mathematical transformations just sketched is one of the most promising explanations we have of how our brains work. But the eliminativists hold that the theory is so revolutionary and so much more convincing than current theories of the brain -- for instance, that the brain is basically propositional and language-oriented -- that it will eventually displace and replace the linguistic theory, just as the modern theory of mental disease displaced the medieval theory of demonic possession. Against them stand the reductive materialists, I among them, who share their enthusiasm for the new theory but believe that it will successfully reduce at least portions of the old theory the way Einstein's relativity successfully reduced Newton's laws of motion.

A couple of further comments on reductive materialism are in order. First, what is the status of mathematical concepts like numbers, mythical figures like river nymphs, comic-book characters like Donald Duck, and the like? Non-reductionists argue they are non-material, non-physical entities that are able to influence the physical world yet are inexplicable in terms of natural laws[13]. While granting a fictional, artificially man-made status to such phenomena, reductionists, on the other hand, argue that they do physically exist. Even when they are not physically embodied, say, in maps, epic poems, or comic books, they are actively or passively realized in the brains of intelligences capable of understanding and communicating them. In other words, all such ideas must be created, remembered, and transmitted in the form of appropriately processed neuronal firings by conscious intelligences to have whatever effect they do have outside those intelligences. They are in fact always physically embodied, either in brains or in the artifacts produced as a result of conscious effort. When and if no brain ever again lights up with the concept or memory of them, they have ceased to exist in that form, though most of the atomic elements which have produced them in brains in the past and could

again produce them in the future will probably persist in some form as long as our present cosmos persists. To the reductionist, human thought and feeling are most definitely material entities capable of influencing other material entities like mountains, rivers, metal ores, and electric and nuclear energy in huge and spectacular ways.

The reductionist takes a similar approach to a second objection often raised by non-reductionists: Moral concepts, they say, are not reducible to natural process and physical law. In contrast, the reductionist, convinced that all life is the product of natural selection, sees morality as fundamentally the result of evolutionary survival. Social cooperation, love of one's mate, offspring, relatives, or tribe, repugnance to the murder of one's own species, and the like, are the reverse side of the coin of virtues like social competition, hatred of one's enemies, successful prosecution of war and the killing of one's own species, and the like. They are essentially the residue of human experience on the face of the planet, as are the invention of gods, of creation myths, of apocalyptic destructions of the world, and so on. Furthermore, the reductionist equates moral discrimination with sense discrimination. That is, the ability to sense a difference between heat and cold, light and dark, acid and alkaline is indistinguishable from the ability to decide whether this thing or place or experience is *better or worse* than that thing, place, or experience. Physical sensing and moral judgment have from the start been simultaneous and identical processes, and even the most refined and abstruse moral reasoning is rooted in the slime and grit of earth's natural history. Human beings are moral to the core, not because a deity has commanded them to be or because they've chosen to be but because natural selection has forced them to be[14].

Finally, reductive materialism applauds and identifies itself with the stunning success of the reductive program of 20th century science as a whole. It regards such triumphs of human intelligence as the establishment of the periodic table of elements and of the standard model of elementary particles as surely among humanity's greatest achievements. The periodic table and the standard model are outstanding examples of the relentless effort of scientists in this century to uncover deeper and deeper levels of physical explanation and to reduce their findings to more and more comprehensive and fundamental theories. Equally outstanding has been the effort to unify the four basic forces of nature at greater and greater levels of generalization. Already it has been proven that two of the four forces, electromagnetism and the weak nuclear force, were unified at en-

ergy levels that are theorized to have existed until a billionth of a second after the Big Bang had passed, after which they split. At a still earlier moment, it's theorized that the electroweak force was unified with the strong nuclear force, and at a still more primordial moment before that -- the so-called Planck era, when the universe was still less than 10 to the minus 43rd seconds old and seethed with a thousand million billion billion volts of energy -- the electroweak and strong nuclear forces were still unified with the fourth force, gravity. Modern scientific reductionism has succeeded in showing that the manifold phenomena of physical nature -- light, heat, rocks, flora, fauna, consciousness -- are probably manifestations of a single, foundational, material reality, perhaps ultimately describable in the terms of some future human science. Materialism welcomes this success as further confirmation of its 2500-year-old hypotheses.

[Richard C. Vitzthum is the author of *Materialism: An Affirmative History and Definition* (Buffalo, NY: Prometheus Books, 1995).]

Endnotes (by Keith Augustine)

[1] One may object to Vitzthum's contention that the universe is infinite in extent and has existed eternally as being contrary to modern cosmology. The consensus view of modern cosmologists is that the universe--that is, all space and time--was created fifteen to twenty billion years ago with the Big Bang. Furthermore, physicists like Stephen Hawking have proposed that we live in a finite yet unbounded universe (see Hawking's *A Brief History of Time*). It is clear from his *Materialism: An Affirmative History and Definition* that Vitzthum does not dispute either that the Big Bang was the creation of the space-time manifold we inhabit or that Hawking's finite yet unbounded universe, where there simply is no 'before' the Big Bang (since the Big Bang created time) any more than there is a place north of the North Pole, may be true. In such a view, the Big Bang doesn't result from a fireball spontaneously appearing from absolute nothingness, but rather it doesn't make any sense to speak of a time before the Big Bang. The Big Bang would simply be time zero from which the universe began. Other possibilities are that the universe is just one out of an infinite number of universes that preceded it through a Big Bang--Big Crunch--Big Bang cycle (such a view introduces a hypothetical *meta*time that is completely independent of time as we know it), that the Big Bang

emerged from a quantum fluctuation in some quantum universe completely independent of and isolated from the universe we inhabit (quantum genesis), or that our universe formed when a black hole in another universe pinched off and became causally isolated from ours. Perhaps our universe is just one of an infinite number of other universes; or perhaps our universe is the only universe that ever was, is, or will be.

[2] Materialism has enjoyed widespread acceptance among well-educated twentieth-century thinkers. In the Preface to *Contemporary Materialism: A Reader*, Paul Moser and J. D. Trout write: "Materialism, put broadly, affirms that all phenomena are physical... Materialism is now the dominant systematic ontology among philosophers and scientists, and there are currently no established alternative ontological views competing with it" (p. ix). Jaegwon Kim, a philosopher at the forefront in the philosophy of mind, agrees: "There has been a virtual consensus, one that has held for years, that the world is essentially physical, at least in the following sense: if all matter were to be removed from the world, nothing would remain--no minds, no 'entelechies', and no 'vital forces'... [M]ental states and processes are to be construed as states and processes occurring in certain complex physical systems, such as biological organisms, not as states of some ghostly immaterial beings [i.e. souls]" (p. 579 of "Mind-body problem, the" by Jaegwon Kim in *The Oxford Companion to Philosophy* edited by Ted Honderich).

[3] Reductionist materialism holds that mental states are *identical to* brain states, "that facts about mentality are reducible to physical facts, i.e. facts about matter and material processes" (p. 751 of " Reductionism, Mental" by Jaegwon Kim in *The Oxford Companion to Philosophy* edited by Ted Honderich). On a reductionist view, there is nothing about consciousness that is "over and above" physical brain processes.

[4] Eliminative materialists contend that minds don't exist, that our 'vague talk' about things like feelings, thoughts, desires, etc, needs to be eliminated from our vocabulary and replaced with precise scientific terms referring only to brain states. In his Preface to the Paperback Edition (1992) of his *A Materialist Theory of the Mind*, David Armstrong confesses: "One Materialist theory I have never been drawn to is the Eliminativist account of the mental... If I were to become convinced that there is an incompatibility between a materialist or physicalist view of the world and the existence of the mental, then I would reluctantly turn Dualist. Materialism is a theory, even if, as I think, a good theory. The existence of mental things--pains, beliefs, and so on--seems to me to be part of

bedrock, Moorean, commonsense. Its epistemic warrant is far better than that of Materialism" (p. xix).

[5] In the March 25, 1996 edition of *Time Magazine*, an article by Robert Wright titled "Can Machines Think?" raised the question of how eliminativism and reductionism differ, or in Wright's words, "Some laypeople (like me, for example) have trouble seeing the difference between... saying consciousness doesn't exist and saying it is nothing more than the brain." The question can be restated as follows: Since both eliminativists and reductionists believe only in physical substances and properties, how do these two points of view differ? If the mind is physical, what does reductionism have that eliminativism lacks, since both only admit the existence of the physical? The article argues that advances in artificial intelligence only amplify what Wright calls the "extraness" of consciousness, the fact that one can explain human behavior in purely physical terms without ever invoking a the idea of mind, implying that consciousness must therefore be "over and above" the brain. In this article David Chalmers proposes that one could imagine a universe *exactly* physically identical to the universe we know yet without consciousness as an argument in favor of property dualism.

[6] The reductionist's claim that mental states are identical to physical brain states is an example of intertheoretic reduction. Several examples of intertheoretic reduction exist in science: Lightning is identical to an electrical discharge; water is identical to H2O; light is identical to electromagnetic waves; sound is identical to compression waves traveling through a medium; genes are identical to the DNA molecule, etc. These examples all share one very important feature: They are all cases where our common-sense framework has been reduced to a new conceptual framework.

[7] Property dualism holds that nonphysical *substances* or things do not exist (e.g. immaterial souls which make organisms conscious, vitalist 'life forces' which make organisms alive as opposed to inanimate, and deities and other 'spiritual' beings), but that there are nonphysical *properties* of physical matter. Among this class of nonphysical properties are what we call mental states, and they are produced by physical brains. For the property dualist, only physical substances exist, but these physical 'things' can have physical or nonphysical properties. Consciousness, it is argued, is a nonphysical property of the brain because it doesn't have properties commonly associated with physical phenomena (e.g. mass, shape, size, density, electric charge, temperature, position in space, etc).

[8] Functionalists claim that mental states are functional states (*rather than* brain states) which connect input (environmental stimuli), other mental states (interconnected functions), and output (behavioral responses) in a cognitive system by means of *causal relations*. Jaegwon Kim explains this definition as follows: "Pain, for example, is to be understood in terms of its function as a causal intermediary between sensory input (e.g. tissue damage), behaviour output (e.g. wincing), and other mental states (e.g. desire to be rid of it). Most functionalists are physicalists [materialists] in that they hold that only appropriate physical states could serve as such causal intermediaries. But they... [hold that] mental properties cannot be identified with physical-biological properties. And functionalism construes psychology as a scientific study of these functional properties [while neuroscience is distinguishably the study of neural properties] and kinds, specified in terms of their causal roles... This view of psychology... is, arguably, the received view of the nature of cognitive science" (p. 580 of "Mind-body problem, the" by Jaegwon Kim in *The Oxford Companion to Philosophy* edited by Ted Honderich).

[9] Jaegwon Kim defines supervenience as the idea that "once all the physical facts about your body are fixed, that fixes all the facts about your mental life... [W]hat mental properties you instantiate is wholly dependent on the features and characteristics of your bodily processes. This 'supervenience physicalism' may be regarded as... the weakest commitment any physicalist must make" (p. 580 of "Mind-body problem, the" by Jaegwon Kim in *The Oxford Companion to Philosophy* edited by Ted Honderich). Kim also points out that "[o]thers maintain that the mind-body relation is adequately characterized as one of 'supervenience'--that is, in the claim that there could not be two entities, or worlds, that are exactly alike in all physical respects but differ in some mental respect... [T]he reductionist, the functionalist, and even the epiphenomenalist are all committed to mind-body supervenience" (p. 576 of "Mind, problems of the philosophy of" by Jaegwon Kim in *The Oxford Companion to Philosophy* edited by Ted Honderich). Epiphenomenalism is a type of property dualism which contends that mental states are mere *nonphysical* by-products or effects of neural firings that themselves have no effects on the physical world--including the brain--whatsoever.

[10] Naturalists (from philosophical naturalism) might object that human consciousness is totally *natural*--i.e. not supernatural--yet still nonphysical (lacking physical properties). In such a view, natural would be seen as being more inclusive a term than

physical: e.g. a naturalist might believe that the term *natural* encompasses everything physical, nonphysical mental states, and perhaps nonphysical abstract objects like numbers. To a reductionist materialist, 'natural' is synonymous with 'physical'.

[11] A materialist theory of the mind which invokes a *token identity* maintains that each instance of a mental type is identical to each instance of a physical type. That is to say, mental states aren't exclusively identified with brain states, as they are in a *type identity*. A token identity allows the possibility that the same mental state--pain, for example--could be instantiated not only in the human brain but also in different physical systems, such as computers or radically different alien brains. The type-token identity distinction can be illustrated in other phenomena in nature: lightning is a type identity because it is a category (or type) of natural phenomena that is identical to a category of electrical discharge. A single lightning flash is a token identity: An individual flash of lightning is token identical to an individual electrical discharge. Thus, the broader type identities refer to classes of objects or events, whereas token identities refer to specific cases. A token identity is an essential characteristic of functionalism.

[12] Although the view that one can know his own mental states incorrigibly has been defended by nonreductionists like John Searle, this position is not a *necessary* assumption of all forms of nonreductive materialism. A nonreductionist might argue, for example, that he does not know his own *qualia* or subjective experience infallibly, but that he *does know* that what he has access to in introspection is nonphysical subjective experience.

[13] One should understand here that nonreductionists also grant a fictional status to concepts such as river nymphs and comic-book characters. A nonreductionist argument is that numbers, sets, universals, and other abstract objects exist independently of the physical world. David Armstrong has commented on this: "Suppose... that there is a transcendent realm of numbers. How scientifically-implausible to think that this realm, or members of this realm, can act on brains!" (p. 38 of "Naturalism, Materialism, and First Philosophy" by David Armstrong in *Contemporary Materialism* edited by Paul K. Moser and J. D. Trout).

[14] An evolutionary account of the origin of moral judgment in human beings does not tell us what (if anything) makes a specific action *moral*. On a materialist view, all codes

of conduct must ultimately be man-made or socially constructed; there are no objective moral laws existing independently of sentient beings in the way that laws of nature do. Thus there are no *objective* criteria for determining if human actions are right or wrong. The objectivity of laws of nature is clear--our approximations to them (laws of physics) are publicly falsifiable and can be corroborated by empirical evidence. Moreover, unlike natural laws, moral laws can be violated. But if what we call moral laws are really man-made inventions, our ethical rules are arbitrary and thus individuals are not obligated to follow them. Nothing makes an action objectively moral or immoral; individual and social codes vary because ethics, like beauty, is in the eye of the beholder. But then there are no compelling grounds for arguing that Aztec human sacrifice, Nazi or Serbian genocide, or infanticide is *really* wrong. Core ethical rules are no doubt determined by intersubjective consensus across cultures--for example, incest and murder are universally prohibited. But such consensus does not demonstrate the objectivity of ethics; it merely demonstrates that human beings or societies are largely 'built' the same way and react similarly to certain types of behavior. Suppose we have inherited an aversion to committing murder. That such a genetic disposition would be widespread makes evolutionary sense. A known murderer's neighbors will fear that the murderer might kill them. Out of mutual self-interest they would be wise to band together and eliminate the murderer before he could eliminate them. Since murderers would tend to be eliminated before they could reproduce, individuals with a genetic inclination to commit murder would tend to dwindle. But this is merely an accident of natural selection, and trying to base morality on the fact that adhering to certain ethical norms will make you more "fit" to stay alive and reproduce is insufficient. The origin of behavior is irrelevant to whether a behavior is right or wrong; what makes an individual evolutionarily 'fit' (e.g. infidelity) is not necessarily moral. There will no doubt still be some individuals who are genetically inclined to commit murder; but we do not conclude that the are exempt from moral prohibitions on murder because of this. Furthermore, the fitness of certain evolutionary traits changes when the environment changes. Would murder suddenly become morally acceptable--even obligatory--if it provided us a selective advantage? On a materialist account, the only foundations for behavioral codes are preserving self-interest *and* satisfying one's conscience--there are no additional 'moral facts' which motivate behavior.

Further Reading:

- Materialism (Routledge Encyclopedia of Philosophy)
- Epicurus (Internet Encyclopedia of Philosophy)
- *The Epicurus Reader*: Introduction (D.S. Hutchinson)
- Lucretius (Internet Encyclopedia of Philosophy)
- D'Holbach's *Common Sense* (excerpts)
  [Note: The listed publication date is erroneous; *Common Sense* appeared in 1772]
- *Baron d'Holbach: A Study of 18th Century Radicalism in France* (Max Pearson Cushing) [text]
- Baron d'Holbach (Stanford Encyclopedia of Philosophy)
- Baron d'Holbach (Skeptic's Dictionary)
- Ludwig Büchner (PDF download, Routledge Encyclopedia of Philosophy)
- Ludwig Büchner biography (Spanish) [translate]
- Büchner's *Force and Matter*, 1855 ed. (Spanish) [translate]
