# You Are Not Your Brain: Against Teaching to the Brain


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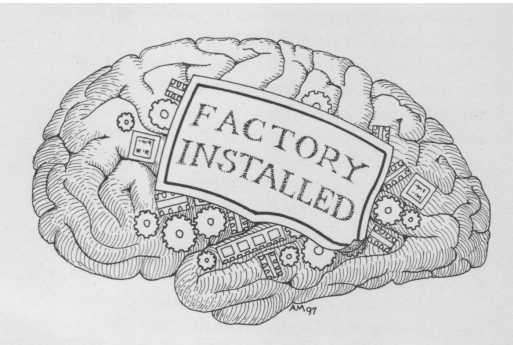
### Abstract

Since educators are always looking for ways to improve their practice, and since empirical science is now accepted in our worldview as the final arbiter of truth, it is no surprise they have been lured toward cognitive neuroscience in hopes that discovering how the brain learns will provide a nutshell explanation for student learning in general. I argue that identifying the person with the brain is *scientism* (not science), that the brain is not the person, and that it is the person who learns. In fact the brain only responds to the learning of embodied experience within the extra-neural network of intersubjective communications. Learning is a dynamic, cultural activity, not a neural program. Brain-based learning is unnecessary for educators and may be dangerous in that a culturally narrow ontology is taken for granted, thus restricting our creativity and imagination, and narrowing the human community.



[keywords: selfhood, neuroscience, cognitive science, brain-based learning, intersubjectivity, consciousness, philosophy of mind, explanatory gap, cultural construction, reductionism, scientism, education, learning theory, curriculum theory]

## Introduction

> *Human experience is a dance that unfolds in the world and with others. You are not your brain. We are not locked up in a prison of our own ideas and sensations. The phenomenon of consciousness, like that of life itself, is a world-involving dynamic process. We are already at home in the environment. We are out of our heads.* (Alva Noë, 2009, p. xiii)

Science has become much more than an experimental procedure for creating knowledge of the objective world. We are living in a zeitgeist when the objective reduction to material facts and processes that can be measured defines what is real and true while subjective experience is considered unreliable (and likely a mere product of processes such as biological evolution, genetic codes, and, of course, neural functioning). Historically, schools readily lent themselves to scientific measurement and management practices, but it is only more recently that we have turned to neuroscience and cognitive science in an attempt to directly manage the learning process itself.

I make specific reference here to *brain-based learning*, though I recognize that this is an umbrella term for a wide variety of theories, methods, and proposals, as well as for various competing marketing strategies. I will attempt no comprehensive survey here – historical, comparative, or otherwise – but will assume a generic understanding of the concept.[i] The rapid rise of this approach can be measured by the increasing number of pamphlets, expensive training workshops, books, and online ads (often aimed at educators) devoted to it. What has led to this turn away from the world to the cerebral organ for the sake of learning?

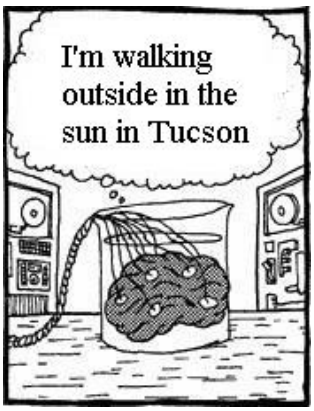
Educational fads come and go. From the free-learning of A. S. Neill's Summerhill to the manipulations of Skinner's behaviourism to the wishful thinking of Gardner's multiple intelligences (no brain modules for such *intelligences* have ever been located), bandwagon theories have appeared and faded. Turning to the brain to better ensure learning may just be another one; however, with the current pressure on educators to predict and measure learning outcomes with quantitative accuracy, there is the possibility that teachers feel some desperation for a more scientific approach. In their need to meet such government-imposed objective standards, educators may be easy targets for those who market such programs and proclaim them backed by solid scientific research. Aside from the fact that such solid scientific backing is at best uncertain, perhaps the bigger question that needs to be asked is how we have come to believe that science can solve all our problems, even those to do with learning, generally considered a culturally specific phenomenon occurring within human relationships.

The reason is simply that in this era, scientism (not *science* itself, which is experimental and open to change) has become the guiding belief system – one might say our academic *zeitgeist* – for determining reality. Yes, *reality*: As a worldview, scientism becomes ideology or even religion. Scientism is in the ontological camp of objective-materialism, also known as *realism* – one ultimate reality (monism), not two (dualism, usually mind and matter), though this is questionable for observers are not merely passive. For objective-materialism, ultimate truth is always *objective* ("out there", not subjective), and it is *material* (made of matter, not spiritual or mental or cultural).

This worldview of scientism has become so well established in our time that it is considered time-wasting *philosophy* – the utmost in bad taste – to even question it. Stephen Hawking, one of our premier scientists, has declared that "philosophy is dead. Philosophy has not kept up with modern developments in science, particularly physics. Scientists have become the bearers of the torch of discovery in our quest for knowledge" (Hawking & Mlodinow, 2010, p. 5). Philosophers have, of course, protested, "To the contrary, when philosophy

is excluded from the discussion, then tacit philosophical assumptions – in all likelihood metaphysical assumptions! – go unquestioned" (Globus, 2009, p. 110). Scientism (and much of real science) has precisely the metaphysical assumptions I have indicated. Philosopher and scientist, Alva Noë (2009), states that "neuroscience today depends on a somewhat stagnant set of philosophical presumptions" (p. 189), i.e., that the brain *is* the mind. It is not wild-eyed spirituality to suggest that a person is more than a brain, and that reality may turn out to have at least as large a subjective (experiential) as objective (material) component. In what follows, I will be daring to question some of the unspoken philosophical assumptions behind brain-based learning, especially those to do with consciousness and personhood.

## The Neuroscience of Brain-Based Learning




I am not about to engage in a belaboured postmodernesque philosophical exegesis of minds, brains, and words, but I do want to raise the question of exactly how brain-based learning is to be understood. Clearly, if learning is taking place, there must be a learner. If learning is something the brain does (as *brain-based* implies), can the learner himself or herself be anything (or anyone) other than the brain? To put it another way, *are you your brain*? This may seem an absurd question to many, but there is no shortage of scientific *and* philosophic research that insists precisely on this. Brain-based learning avoids this question by depending on rarer currents of neuro- and cognitive science that emphasize degrees of neural plasticity (from epigenetics to radically responsive neural mapping) that indicate the brain responds to environmental stimuli, perhaps leaving room for conscious self-agency in that interaction. For mainstream cognitive science, however, the assumption is that the brain represents the world and directs the body to meet its needs in that world, so such self-agency is an illusion. In this case, the material brain has absorbed or simply done away with the immaterial mind (i.e., conscious selfhood). How have we managed to install or dissolve our identities into a jellylike 1400 gm lump of pink-grey matter? When and how did we become our brains?

***Mainstream Neuroscience***. The metaphor for the brain as learner and director of bodily behaviour is the machine – either a *meat machine* that, like the proverbial brain in a vat, controls our experiences by controlling our illusions; or a computer, that analyses all inputs, stores them in data banks, and computes the best actions to take. Either the brain is seen as the central command for the workings of the body and the mind or, metaphorically, it is the computer hard-drive that keeps the reality show software going. Both the wetware or hardware view indicate we could be learning and acting just as well if our conscious minds were ineffectual or if we were not conscious at all since unconscious directives or computations are all that's required.

The brain-as-selection organ and brain-as-computer crowd deny the brain's plasticity, though the former does accept its evolutionary changes meant to enhance reproductive success.[ii] Both see its information processing structures as basically unchanging, one's behaviour *and* experience as determined by brain functioning, and consciousness most often as unnecessary – an *epiphenomenon* – or at most an after-the-fact (late learning) feedback system. This position is known as *eliminative materialism* since the efficacy of the mind and often its reality are eliminated by recognition of the primacy of material (brain) processes. Not only scientists but also influential philosophers like Daniel Dennett and Patricia Churchland take this position.[iii] Note that the mind or consciousness is not only regarded as without influence on behaviour but often its very existence is in question, an illusion dismissed as folk psychology or the subjective position taken in discourse.

This hard science view of brain determinism seems to be largely unknown or at least ignored by the purveyors of brain-based learning. It is certainly not a popular position among educators or learning theoreticians since it implies that there is little we educators can do to change a mind already set within the predetermined genetics of a particular brain. Mental experience as an illusion of the deterministic brain goes at least back to La Mettrie (*L'homme Machine*, 1748). Physiologist Pierre Jean George Cabanis (1757-1808) is said to have written, "The brain secretes thought as the liver secretes bile" (in Copleston, 1961, 6:51).

More famously, Francis Crick, the Nobel-winning molecular biologist, biophysicist, and neuroscientist explained away inner experience this way:

> The astonishing hypothesis is that "You", your joys and your sorrows, your memories and your ambitions, your sense of personal identity and free will, are in fact no more than the behaviour of a vast assembly of nerve cells and their associated molecules. As Lewis Carroll's Alice might have phrased it: "You're nothing but a pack of neurones!" (1994, p. 3)

Neuroscientist Michael Gazzaniga (1998), known for his pioneering work with split-brain (severed corpus callosum) patients, makes his stance against the brain's plasticity quite clear: "The intriguing hypothesis that real-world experience sculpts neurons back from their exuberant growth overlooks a major point. Most exuberance and subsequent pruning happens before birth, leaving moot the possibility that this neural development is under psychological guidance" (p. 56).[iv] No need to be concerned about choosing actions to guide the brain's learning from the deterministic neuroscientific perspective. Gazzaniga continues:

> Everything from perceptual phenomena to intuitive physics to social exchange rules comes with the brain. *These things are not learned*; they are innately structured. Each device solves a different problem. Not to recognize this simple truth is to live in a dream world. (p. 170, my italics)

In 2003, outspoken neuroscientist V. S. Ramachandran began his Reith Lectures with these remarkable words:

> Even though it is common knowledge these days, it never ceases to amaze me that all the richness of our mental life – all our feelings, our emotions, our thoughts, our ambitions, our love lives, our religious sentiments and even what each of us regards as his or her own intimate private self – is simply the activities of these little specks of jelly in our heads, in our brains. There is nothing else. (Lecture 1)

Clearly, in this situation, *you are your brain*: "There is nothing else". Moreover, *you* (your conscious self) are not the central command or even an influence in this brain but merely a byproduct (in the way indicated by Cabanis above) – since it seems neither the environment, social interactions, nor personal choice are inputs that directly affect your experience and behaviour, at least until these things have been appropriately processed by the brain and indirect choices made for you. Note that Ramachandran refers to the world-creating brain as "common knowledge", and this does seem to be the common view amongst neuroscientists. It is hard to see how such worldview that denies external sources of learning and even a degree of human free will could be in any way amenable to educators who depend, after all, on the social exchange of teaching and learning and the power of students to think for themselves. This is mainstream neuroscience, not the minority version of neuroscience that views the brain as a receptive organ that fundamentally *changes* – brain *plasticity* – as the result of influences from the body, the environment, or the culture.

It is no mystery why those who benefit from packaging and selling brain-based learning to educators would prefer to keep this *other*, non-plastic, deterministic perspective under wraps. If it were accepted, it would leave little for educators to do beyond the meeting of basic needs, information transmission (still the mainstay of teaching), and, down the road, such physical manipulations as gene splicing or even microscopic neural transplants. We could improve the wetware or hardware, but the brain could not be *taught* to learn better, so brain-based learning and traditional teaching would be out of business. This in fact is the source of the continuing outcry against the studies of innate intelligence found in Herrnstein & Murray (1994) and Jensen (1998), despite the fact that both of these books were formidably researched. It leaves one wondering how something calling itself *brain-based learning*, which claims to base its methods on neuroscientific research, can completely ignore the consciousness and free-will denying hard science found therein.

On closer examination, however, it appears brain-based learning not only ignores a great deal of hard neuroscience, but it also cherry picks that which supports an already well-established program of teaching methods that looks suspiciously similar to the proposals of progressive education promulgated by John Dewey a century ago. Insofar as brain-based learning returns the educational focus to individual development, novelty, and interpersonal practices, this can only be applauded; however, one still wonders why it was considered necessary to side track into brain science to bring about changes most thinking educators already agree are positive. Choosing to focus on the plasticity of the brain with its mutable and interactive neural assemblies responsive to experience in the world, brain-based learning leaves itself with an approach that pretends to focus on *teaching to the brain*, but, in most cases, is instead still teaching to the mind – and there *is* a difference – or to the community. Dynamic neural maps indicating new learning may be less a product of well-functioning cerebral structures than interiorized reflections of interactive human experience in the world.

It should make educators uneasy that an area identifying itself as brain-based learning has such uncertain neuroscience to back it up. Sources are certainly found in theoretic cognitive science, but these are rarely backed up by concrete experimental evidence. Neuroscience deals with the most complex organ in the human body, and its relation to human experience in the world is even more complex, so it should be no surprise to learn that it is still a developing field. Dr. John Bruer, "president of the James S. McDonnell Foundation, which supports research and education related to the brain" stated, "Brain science … can tell us very little about how the brain learns and it is far too early to take what we know at this point and plug it into our curriculum," according to Gabriel (2001, p. 1). He adds, quoting Dr. Kurt Fischer, whom he identifies as the Charles Bigelow Professor of Education and director of the mind, brain, and education concentration at the Harvard School of Education: "Most of the brain research is very far from what goes on in the classroom." In the past 10 years, it seems neuroscience has moved even more stubbornly into the objective-materialist worldview, which begs the question of exactly what neuroscience brain-based learning is itself based upon.

***Brain Imaging.*** Still, enough is known about the brain's seemingly modular construction and its extraordinary electrochemical interactions for theoreticians and neuroscientists to imagine that the brain is *learning* when it may only be adapting to environmental circumstances. It should be borne in mind that most of what we know about the brain's activity is through recently invented brain-imaging techniques.[v] Calling these techniques *the new phrenology*, Noë (2009) declares, "It would be hard to overstate the extent to which the fervor about the brain-based view of consciousness is driven by the development in the last few years of new technologies of brain imaging" (p. 19). Noë states:

> Brain scans thus represent the mind at three steps of removal: they represent physical magnitudes correlated to blood flow; the blood flow in turn is correlated to neural activity; the neural activity in turn is supposed to correlate to mental activity. If all the assumptions are accurate, a brain-scan image may contain important information about neural activity related to a cognitive process. But we need to take

> care not to be misled by the visual, pictorial character of these images. Brain scans are not pictures of cognitive processes of the brain in action. (p. 24)

Noë also observes that since the brain is *always* active and these scans indicate all sorts of things going on during different experiences or physical events, there is no way of identifying with certainty what electrochemical activity equates with what experience or event, especially most of what the brain does is never associated with consciousness. Indeed, when the brain activity is observed while the patient is rendered unconscious, electrical activity seems to *increase* in a chaotic fashion, rather than *decrease* as might be expected (ScienceDaily, 2011)!

In reference to above mentioned article (ScienceDaily, 2011), I note certain quotations from the unidentified author attributed to Brian Pollard, Professor of Anesthesia at the University of Manchester, which precisely engage in the errors of presumption found in scientism: "We are currently working on trying to interpret the changes that we have observed" (ScienceDaily). This is the key admission of the whole article and tells us, in general, how little brain imaging techniques reveal about our conscious experience or its loss. No matter what the scientists see on their screens, it is still educated speculation to relate the electronic imaging of brain activity to actual human experience. All the scanning blips or colourful images are dependent on their interpretation by a human mind that must use words to express any sort of meaning. It is not brain activity that is central here, but its conscious interpretation. In short, brain-imaging techniques may *represent* the brain in action but not the mind in action. All scans and images must be interpreted by an observing human mind, which has its own expectations and biases, including the assumption that it is watching a mind when it is really observing only the varied electrochemical activity of a brain. In a convincing assessment, Legrenzi and Umilta (2011) argue that brain scans do not differentiate between conscious and unconscious phenomena, so cannot represent human cognition or psychological experience. However, colourful brain images perpetuated in the media have the effect of equating the person with the brain or body, and this may have a number of sociopolitical consequences, including a tendency toward top-down totalitarianism (society mimicking the body) and identifying personal lived experience with the life functions of the body.

***Problems with Plasticity.*** Still, even without depending on brain imagery, it seems all brain-based learning needs is the widely-supported theory that the brain is *plastic*, that is, that it can learn from its inputs – activities of the body, events in the environment, personal experiences, and relationships. This seems to be enough to convince many that we can teach the brain to do this learning better. It's only natural that educators prefer the brain's plasticity and neural constructivism to the neural determinism of eliminative materialism, and I believe there is good reason for such a preference. However, embracing neural plasticity raises other questions that put brain-based learning in an uncomfortable position.

You see, if the brain is so plastic or constructive that it responds to embodied experience in an environment then the brain is an organ of response just as much as it is an organ that determines response (as well as the nature of the world or of experience itself). In fact, the brain evolved in response to changes in the environment. Furthermore, as human experience broke across the *symbolic threshold* (Deacon, 1997) into language, growth in certain cerebral lobes or modules like the prefrontal cortex became necessary when new neural pathways were needed as speech developed and spread. Culture changed the brain or, as Deacon (1997) put it, *language and the brain co-evolved*. Today the brain may very well continue to be as much a responsive organ (exquisitely complex as it may be) as a determining organ, but, if this is so, what have we to gain by studying its exquisite complexities? If embodied experience in an environment – including an abstract cultural environment – can change the brain's neural codes then why not do the obvious and continue to learn from guided embodied experience in a rich learning environment, as the best schools have done for over a hundred years? If we accept that persons make choices then such choices are reflected in brains but not

caused by them. Why study the *middle-man*, the brain, when it can only reflect our own teaching and learning back to us?

This seems an important question for brain-based educators to face: If the brain is not plastic, then it need only be genetically manipulated by improved technology. If the brain is plastic, then we have more to gain learning about what we do with each other right out here in the world and less to gain by discovering exactly how our learning is changing our neural codes.

But the problems do not stop here. Going back to philosophy and the question of *Are you your brain?* we will see how conscious experience – the "you" you know yourself to be – continues to defy an explanation based in cerebral processes, objective-materialism, or scientism of any sort. The *explanatory gap* between conscious experience and brain function remains, leaving the source of your conscious self-identity still open to speculation. Furthermore, the objectivist worldview of classical physics has not budged even in the face of the farther reaches of physics – discovering that, at the quantum level, the observer directly affects what is observed. These will be briefly surveyed in what follows.

## Why You Are Not Your Brain

Many will say, "Of course *I* am not my brain, but I need my brain in the same way a driver needs a car. The car is not the driver, but it may help me to get where I am going if I better understand the workings of the automobile. So it is with the brain. Knowing how it works will help me, the learner, to learn more, learn faster and retain it better." This is, however, faulty reasoning, depending on several unverifiable assumptions. For one thing, the driver does not need to know how the car works to make it drive from place to place. I am living proof of that. For another, cars are built by people, so their functioning is a manifestation of the workings of a great many human minds working together in various roles. Human brains also *always* work together with other brains. This *working together* already exceeds the capacity of isolated human brains; it is the medium of human symbolic communication that links brains, but note that this medium is not made of neurons, axons, dendrites, cerebral lobes, or even neural assemblies. This medium is none other than human culture and its technological extensions; culture is more the source of the self and world we experience as our core reality than is the brain. The car does not drive me; I drive it.

Experience or consciousness is always first and last, as radical constructivism and phenomenology have taught us. It is what we are, and it is the true bottom line of all knowing and learning. We will never find the smallest bit of reality in matter – be it a subatomic particle, quark, or cosmic string – for the final fact will always be our knowledge or experience of said postulated object. There is a sense in which I am my brain, but there is also a sense in which I am my body, and, since that body intermingles with a world, there is a sense in which I am a living aspect of that world. But what we most immediately and obviously know ourselves to be is our own awareness, which is identical with our being.[vi] If we were unaware, we would not exist or at least have no sense of existence: *we would not be*.

So consciousness matters or we would be nothing at all. To those who insist that they are not their brains, yet insist that understanding the brain's parts and functioning in minute detail will make them better, smarter, wiser people, I have to note the contradiction: Learning all about automobiles and their workings – even improving on such workings – will not make me a better, smarter, wiser driver. Only my will and my choices can do that. Needless to say, I admit that a deficient automobile (or a deficient brain) that can be repaired should be repaired and, with technological (or bioengineered) enhancements, may even extend the range of my abilities. The point, however, is that driving skills are not taught to automobiles, and thinking skills are not taught to brains. Both are taught to *persons* whose cars or brains then adapt accordingly.

Without delving deeply into the excruciatingly complex subject of quantum physics (often confusingly called quantum mechanics since it is ultimately a reality known only via the most arcane mathematics), I wish only to point out that in the last century it was discovered that at subatomic levels the observer was shown to have definite effects on what was being observed, though materialists to this day struggle mightily to find a way around this conundrum. The *observer effect*, accepted by the Copenhagen School of quantum interpretation, notes the speed and the position of certain subatomic particles or photons cannot be measured simultaneously (the famous uncertainty principle of Heisenberg). To observe or measure one is to determine its velocity *or* its position, but not both. Whichever is chosen the other will become unknowable or indeterminate. Before observation, it is surmised that reality is consists of chaotic quantum fields of indeterminate waves held in a *superposition* of potential form. Only upon observation does the wave of near-infinite possibility[vii] collapse into a definable form in which either position or momentum can be measured.[viii]

This is of course a gross simplification by a non-specialist, but it does indicate the reality of the mind and the participation in the unfolding of the real world that actually takes place with each observation. *If matter, at its most fundamental level, is changed by conscious observation (as the quantum observer effect indicates) then matter (including brain matter) cannot be the ultimate source of the conscious observe*r. This strange state of affairs has been well known for more than a century, yet it has been largely ignored by mainstream science, likely because it appears to directly contradict the materialist worldview. It seems that we – as conscious beings – are neither separate substances from matter (as in Cartesian dualism), nor are we merely passive observers of a pre-established, exterior, material reality (including the brain), as in scientific dualism. Mind and matter may be co-creative, mutually implicated in each other. If the brain is not the source, whence the conscious self?

This is not an easy question to answer, especially since philosopher David Chalmers (1995) made famous the previously noted distinction between the "easy" and the "hard" problems of consciousness. The easy problems are those that can potentially be explained by the examination of brain activity, which includes most of the content of consciousness. The *hard problem*, however, is how and why there is conscious awareness at all. To this point, neuroscience has been no help in explaining this: "The really hard problem of consciousness is the problem of experience" (Chalmers, p. 200). This difference – the explanatory gap – was adroitly noted as far back as 1879 when psycho-neurologist John Tyndall conceptualized the impossible rift:

> The passage from the physics of the brain to the corresponding facts of consciousness is unthinkable. Granted that a definite thought and a definite molecular action in the brain occur simultaneously; we do not possess the intellectual organ, nor apparently any rudiment of the organ, which would enable us to pass, by a process of reasoning, from one to the other. (Cited in Seager, p. 272)

The recognition of the *explanatory gap* between lived experience and the functioning of the brain has been long recognized. Even if *neural correlates of consciousness* (NCCs) are found in the brain, there will still be no explanation how they are connected to the immediacy of conscious experience. It has been solace for the spiritual minded who wish to believe in a detachable soul, but this leads only back into the incompatibilities of dualism (not to mention wishful-thinking). The only sensible choice seems to be that the *material* and, for lack of a better term, the *mental* are one elemental substance or process. In some way experience and the material world in which we find ourselves are mutually implicated in each other, a position that certainly includes the apparent anomalies of quantum physics.

This is highly speculative, of course, but philosophical phenomenology, which begins with the reality of lived experience (as opposed to beginning with an objective external world), has long understood world and conscious experience to be co-creative. Phenomenologist Maurice Merleau-Ponty (1968) suggested that both

subjective experience and the material world are mutually united in an objective dance. Radical constructivism (e.g., Goodman, 1978) understands the world as constructed by the unconscious consensus of all minds. Panpsychism (cf. Skrbina, 2009) or panexperientialism (cf. Nixon, 2010) are attempts to grant all material reality varied levels of consciousness or experience.

Hawking and Mlodinow (2010) went far enough in this direction to accept that any number of cosmic theories might be true depending on the consistency of the model that was constructed to interpret reality. However, they made certain that, in spite of their *model-dependent realism*, the traditional worldview of objective-materialism was still granted primacy (though certain intellectual contortions were required). The mind-independent worldview of objective materialism becomes hard to defend when it is simultaneously accepted that mind (the observer) is a necessary participant in reality (as model-dependent realism suggests). As I wrote elsewhere: "To objectify a mind-independent reality, then to look for mind in that mind-independent reality, is a bizarre sort of logic to say the least" (Nixon, 1997, p. 16).

I recognize that these are pretty *out there* philosophical speculations for many and will provide no incentive to consider themselves anything but manifestations of their brains. Even with a panpsychist worldview, say, there is still reason to study how brains learn since brains may be the only way that panpsychic (universal) awareness achieves knowledge, intelligence, or selfhood. With this last point, I beg to differ from a more down-to-earth perspective.

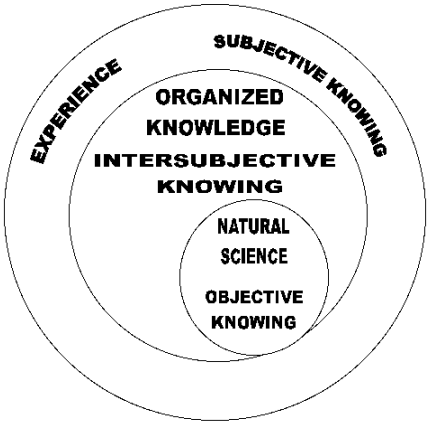
Simply put, we are not born with knowledge, intelligence, or selfhood. In fact, we must interact with others and the world so we can learn how to perceive and what is perceived through our senses. We don't exist as conscious selves first and then learn to recognize the existence of other selves through the postulated absurdity called a *theory of mind*.[ix] Evidence from language studies points to the idea that we are called forth into selfhood by others who have already attained such selfhood within the milieu of a symbolically interactive culture. In other words, interpersonal relationships take place before there is a self-identified person within us (though obviously we experience sensual body awareness). This has been called *primary intersubjectivity* (e.g., Gallagher, 2001): intersubjectivity calls forth subjectivity; culture creates the space for the self to emerge and develop, which self will then contribute to and alter the culture within which it began. This is the self who you are, even though self-conception is really a process that began by identifying with others first.

Why does this matter? Because it indicates you are not your brain but, instead, extend well beyond it – into the world to mingle with the minds of others. This occurs not only because your senses connect you with the natural world of which you are a part, but because our culturally invented codes of communication allow us to breach the barrier of the skull to connect with each other in ways that are often immaterial or at least invisible, though such symbolic communications may take concrete forms. As linguist Wallace Chafe (1994) put it: "When language is made overt, as in speaking and writing, it is able to provide a link between what would otherwise be independent nervous systems, acting as an imperfect substitute for the synapses that fail to bridge the gap from one mind to another" (p. 41). How obvious this is in our time of electronic connectivity!

Noë (2009) adds that the neural plasticity required by brain-based learning may at least partially originate in the requirement that brains respond to the variety of languages we speak or to the textured complexity of any of our forms of communication:

> Neural plasticity, properly understood, teaches us that the brain can never be the whole story about our mental development. Our linguistic capacity … is not a product of a particular neural structure. Language is a shared cultural practice that can only be learned by a person who is one among many in a special kind of cultural ecosystem. (p. 52)

This also implies that our vaunted sense of a central command self somewhere in the brain is an exaggeration.




We, our identities, literally consist of each other, as hermeneutic philosopher Paul Ricoeur has indicated in his complex exploration, *Oneself as Another* (1995). This means our choices are always intricately intertwined with the choices of others (perhaps difficult for our proud individualism to accept). From this perspective, not only are we not our brains, we are not even the independent, isolated minds we each feel we are. (See the figure of Phenomenological Fields of Knowing, at left.)

Noë agrees that we are not our brains (as his very subtitle – *Why You Are Not Your Brain* – indicates), and we would agree that the brain is *necessary but not sufficient* (as the logicians say) for conscious selfhood, thought, and learning. Noë insists we are instead equal parts brain, body, and world, with the latter the foundation of the previous two. I would suggest that symbolic culture should be added to his trinity to make a quaternity since it is an abstract world of its own from which conceptual self-identity originates. Noë suggests the brain response to the person playing it in an environment. In the same way:

> Brains don't think. The idea that a brain could represent the world on its own doesn't make any more sense than the idea that mere marks on a paper could signify all on their own (that is, independently of the larger social practice of reading and writing). The world shows up for us thanks to our interaction with it. It is not made in the brain or by the brain. (p. 164)

## Conclusion

The above indicates that brain-based learning is at least unnecessary. A brain does not learn on its own; *we learn*, and we are not our brains. The brain responds to our learning and experiences as active bodies in the natural world and in the mutually creative process of culture. It is fascinating to study the brain and how it changes as the person learns, but there is unlikely to be any benefit from it in terms of new learning techniques. If the brain is a pulsating grey machine, then it is as determinative and functionally structured as a machine; we can do little with it but attempt to improve its functioning via technological adaptations or molecular bioengineering. If the brain is as plastic as brain-based learning prefers, it is also neither determining nor predictable. A thoroughly adaptable *plastic* brain will continue to learn from and adapt to human interactive experience in the worlds of culture and nature.

But there are other voices that see brain-based learning as not just unnecessary. Insofar as brain-based learning represents the broader continuing paradigm shift into scientism – the reductionist ontology of objective-materialism – the authenticity of the lived reality process in which we are each creative participants is thrown into question, if not disrepute. For those of us who see our ultimate truth in the human experience, brain-based learning, i.e., biologism or scientism, is a sign of dehumanizing times. Wittgensteinian scholar Peter Hacker – interviewed by Garvey (2010) – recently addressed the danger of scientism in no uncertain terms:

> The main barrier is the scientism that pervades our mentality and our culture. We are prone to think that if there's a serious problem, science will find the answer. If science cannot find the answer, then it cannot be a serious problem at all. That seems to me altogether wrong. It goes hand in hand with the thought that philosophy is in the same business as science, as either a handmaiden or as the vanguard

> of science. This prevailing scientism is manifest in the infatuation of the mass media with cognitive neuroscience. The associated misconceptions have started to filter down into the ordinary discourse of educated people. You just have to listen to the BBC to hear people nattering on about their brains and what their brains do or don't do, what their brains make them do and tell them to do. I think this is pretty pernicious – anything but trivial.

Finally, neuroscientist *and* philosopher Raymond Tallis (2011) truculently observes:

> The distinctive features of human beings – self-hood, free will, that collective space called the human world, the sense that we *lead* our lives rather than simply *live* them as organisms do – are being discarded as illusions by many, even by philosophers, who should think a little bit harder and question the glamour of science rather than succumbing to it. … [B]iologism is not only bad science and bad philosophy – bad enough – but also bad for humanity. And even if we are not worried when various modes of biologistic pseudo-science are ubiquitous in our talk about ourselves, surely we should worry when they are starting to be invoked by policy-makers. (pp. 8-9)

Brain-based learning is a symptom of this scientism, neither good science nor good philosophy. So, at the end of this little exegesis, I find I must repeat: brain-based learning is at least unnecessary, but the ontology it assumes may in fact be dangerous, at least philosophically speaking. It supports a narrow worldview that is peculiar to scientifically advanced societies, ignoring all other expressions of the human spirit. Of course, anything that encourages teachers and learners in their learning is worth pursuing to some degree, but the hidden motivations of those who advocate brain-based learning, teaching to the brain, or other educational fads should always be considered, and, more important, the larger worldview assumed by any educational movement should be open to critical or philosophical inquiry lest it simply becomes "self-evident" due to passive compliance, assuming the mantle of the only acceptable truth.

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**Notes**

[i] Some oft-cited names include Cercone (2006); Caine, Caine, & Crowell (1999); Jensen (2008); Springer (2010); Sylwester (1995); Weiss (2000).
[ii] "Evolution works by selection, not by instruction" (Sylwester, 1995, p. 19).
[iii] See, for example, Churchland (1986) and Dennett (1991). Churchland is so taken with the brain she called her book *Neurophilosophy* and sees herself as neurophilosopher.

[iv] Gazzinga's "moot" of self (*psychological*) guidance, however, is the neuroscientific view embraced by brain-based learning, which appears to believe that our knowledge of brain functioning will enable us to choose actions that will assist the brain in choosing actions to aid us in our learning. (I trust the circularity of this reasoning is obvious.)

[v] These range from the older EEG and PET scans to fMRI imaging and to the most recent 3-D technique – "functional electrical impedance tomography by evoked response (fEITER)" (ScienceDaily, 2011).

[vi] It might be noted that esoteric thinking as found in early Buddhism would say that *I* – my awareness or ego-consciousness – is but an aspect of a larger infinite Awareness limited by constraints of nature (e.g., brain and body) and culture. So, instead of referring to "my" awareness, it may be more accurate to say that "I" am but a local focus of Awareness itself.

[vii] The actual form into which the wave collapses can be usually inferred by probability theory, but there is never a guarantee the merely probable will occur.

[viii] There numerous attempts to explore quantum-mind interdependence from which I am generalizing, but I would recommend Stapp (2007) or Globus (2009).

[ix] Basically ToM (theory of mind) theories suggest we come to believe others have minds like us since we observe them react in similar ways to the ways we would react – and we *know* firsthand that we have minds.