

# Eye-to-Eye with Whales: Environmental Thought in a Divided Brain

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## Encountering the “Other”

Perhaps the most important source of experiential learning in my life has been the underwater encounters I’ve had with marine life during more than 50 years of scuba diving in oceans and seas around the world. I have spent nearly a thousand hours submerged while observing coral reef ecosystems. Among the many encounters with wildlife, none has been more influential on my thinking than the chance meetings with marine mammals, especially cetaceans, especially inquisitive whales. One encounter stands apart from all others: it happened near the Great Barrier Reef in the 1990s, during two hours of close engagement with seven dwarf minke whales (*Balaenoptera acutorostrata*) in an area known as the Ribbon Reefs, south of Lizard Island National Park.

Those two hours forever changed my perspective on conservation biology, relationships with wildlife, and the primary purpose of environmental education. In ways that I’m not sure I fully comprehend even now, my views of scientific detachment and objectivity were upended by an emotional flood of wonder and awe in the presence of the whales, one in particular. At first I dismissed it as a temporary sign of emotional weakness, on my part. But on reflection I began to wonder if the weakness might lie in my scientific training or perhaps in my socialization as a human “supremacist.”

Langdon Winner, in his book *The Whale and the Reactor* (1986), describes an epiphany he experienced about the relationship between nature and technology, triggered by his sighting of a grey whale near the Diablo Canyon nuclear reactor in California. My own epiphany near the Ribbon Reefs was also triggered by the actions of a curious whale, this once occurring at the end of a four-day boat trip to observe sharks in the Coral Sea. Our group included a dozen seasoned divers, but few expected to see whales. Many of us were in the final minutes of a dive when the whales approached us. After interacting with five mature whales for over an hour, we were briefly joined by a more timid mother and calf, who soon began moving further away from the boat. With a fresh tank of air, I decided to follow them at a distance, my slow pace seemingly facilitated by the mother, who performed slow barrel rolls beneath her calf, sometimes surfacing with the calf for a breath of air. I followed them underwater for about 40 minutes, alone in the open ocean and a long ways from the boat. Recognizing my dwindling air supply and the need to follow my compass back to the safety of the boat, I waved a grateful goodbye to the whales and turned around in the water column, only to discover, with a startling jolt, a large eye peering intensely into my facemask, less than a meter away. It was the right eye of a 25-foot dwarf minke whale. The whale had somehow approached from behind me without so much as a hint of water pressure moving the hairs on the back of my neck — a diver’s first alert that something big is approaching from the back. After regaining my composure, the whale and I scanned each other for about a minute then locked eyes in what I would describe as a nonverbal form of interspecies communication. Feeling almost giddy, I began gently patting the whale with my left hand, about a foot behind its eye. The riveting eyelock continued for several minutes. I knew it would soon be time to ascend to my safety stop at 15 feet, so I began inching my way toward the surface. Astonishingly, the whale matched my slow rate of ascent exactly, maintaining our eye-to-eye position. Reaching the safety stop, I patted the whale affectionately and with one slow-motion flick of its tail, it surfaced, took a breath, and dove down down down, disappearing

beneath me in the depths where the indigo blues became almost black. I confess to being in tears at that point, trying to make sense of two hours of close encounters with creatures I'd never seen before underwater. The scientist in me was trying to tame the emotional reaction I was having. I started thinking about how people back on the boat would view my sentimental assessment of the encounter. Would I be able to stop crying before the zodiac that was undoubtedly sent out to look for me, found me? Could I explain to inquiring scientific minds what only made sense in my heart? After all, these creatures were being actively hunted by Japanese whaling ships in the Southern ocean. Why did the whales seek human interaction in this way, at this time? Why did one of them peer so deeply and so persistently into my eyes, connecting in ways that I cannot explain without resorting to some banal form of anthropomorphism?

As I surfaced to the distant sound of a zodiac's outboard motor, I knew that these whales had somehow transformed my outlook completely. Whales would never again be just a living resource issue for me. Nor would their protection be merely a question of maximum sustainable yield to be calculated by some desk-bound conservation biologist. It all swiftly became very personal and charged with moral indignation. And it definitely altered my approach to environmental teaching and research in ways I did not anticipate.

In the ensuing years, I have tried to reconcile my interest in marine environmental science with my unscientific insights from encounters with whales. A conventional scientist might observe that I allowed my emotional responses to the whales to bias my teaching and research on this and related topics. One might even go so far as to say that I gave up on research precision and quantification for the warm-and-fuzzy delights of qualitative research and experiential teaching and learning. There is, of course, no scientifically adequate comeback to such a voluntary surrender of rigorously testable reason. The dispassionate scientific method is often embraced as a means of overcoming the weakness of human emotion and bias. Perhaps it is sufficient in my case to accept the charge that I have allowed my emotions — more precisely my capacity for empathy — to direct much of my subsequent research into the question of human relationships with nonhuman nature, especially whales. In fact, I would say that my interest in empathy, as a prerequisite for broad conceptions of sustainability and human-animal relationships, has led me indirectly to research on the human brain and the effects of brain lateralization on how humans relate to nature and wildlife. It is important to emphasize that much of this research has taken me into literature and theories that I am unqualified to judge by any conventional standard of scientific training.

The problems of confirmation bias in this kind of whale-induced brain research are striking, but then again I have come to believe that confirmation bias is pervasive in much of science and unavoidable in matters where the research subject involves human and nonhuman beings that closely exist in an interdependent web of life. I accept that what it means to communicate with whales is never going to be known outside of some quasi-scientific research design and quasi-scientific interpretation of findings. That is not a limitation or criticism of science, in general; only an affirmation of what we are beginning to learn from neuroscience about the divided brain.

### **The Divided Brain**

The fact of brain lateralization in all humans, animals and birds is not controversial in itself. The division between the left and right hemisphere of the brain has long been studied by neuroscientists attempting to understand how the hemispheres differ, and why. Some studies utilize brain injuries to one side to understand hemispheric specialization. Neuropsychologist Roger Sperry won the Nobel prize in medicine for his early work on split-brain patients whose corpus callosum — the bundle of neural fibers that connects the two hemispheres — had been

severed. He and other brain scientists paradoxically use both of their hemispheres simultaneously to understand brain lateralization. Some have used gross over-generalizations to describe left-right differences in function, even as the evidence mounts that both hemispheres are needed for all the big tasks carried out by our brains. This may help explain why earlier studies of the divided brain have long been suspect. The pop psychology approach to right brain/left brain theories of personality in the 1960s and 1970s probably set back much of the serious research on brain lateralization. Far too much was made of the logical (left) and creative (right) split in brainpower. The new and more complex picture emerging from today's neuroscience is more nuanced and much more significant for understanding how we construct our identities and outlooks on the world. For purposes of this paper, perhaps the most important implication of findings in neuroscience are the effects of brain laterality on the formation of environmental worldviews, including how people relate to animals. It is this aspect of neuroscience that I will argue relates closely to my experience with whales and warrants a fresh look by members of AESS, whether or not they seek personal encounters with the Other.

How we, and whales, perceive the world is deeply influenced by how the hemispheres of our brains function and, in effect, compete for dominance. Evidence for this comes not only from findings about the brain hemispheres, themselves, but from important new insights emerging about how the corpus callosum connects the two hemispheres. The corpus callosum is no longer viewed simply as a speed bridge, but more like a speed *governor* and switching station that frequently impedes the flow of information from one side to the other. It may even help foster positive feedback loops that result in left brain dominance, a disturbing trend in the eyes of neuroscientists, such as Dr. Iain McGilchrist.

Perhaps the most polymathic thinker and interpreter of this neuroscience frontier, McGilchrist is a British medical researcher, psychiatrist, philosopher, historian, and former Oxford University English professor. His groundbreaking book, *The Master and his Emissary* (Yale 2009), is much more than a 534-page neuroscientific treatise. Its purpose and ambition is revealed in its imposing subtitle: "The Divided Brain and the Making of the Western World."

After critically examining many of his own assumptions and interpretations, McGilchrist embarks on a sweeping review of both neuroscience and the feedback effects on the brain produced by the evolution of western culture. In a genuinely interdisciplinary tour-de-force connecting neuroscience with the renaissance and reformation, the enlightenment, the romantic period, the industrial revolution, and the rise of modern and post-modern thought, McGilchrist concludes that the human brain is not only profoundly divided but that the increasing imbalance in hemispheric processing is becoming harmful; that its current form of lateralization has been significantly influenced by the incentive structures of western civilization; that it in turn influences the content and direction of historical and contemporary western worldviews; and that together this reciprocal influence results in increasing human reliance on left brain processing, which is highly reductionist and delivers a short-term, local and precise view of reality, to the neglect of needed contextualization and long-term, holistic and intuitive thinking promoted by the right brain.

The content of our relationships with people, other life forms, and valued objects and places, is significantly influenced by the degree of cooperation and competition characterizing the cerebral hemispheres. Our "disposition" toward who and what we relate to is partly a function of which hemisphere frames, focuses, and directs our attention to the world. How we pay attention, in turn, can take different forms based on the mental models of reality that each hemisphere

contributes, as a matter of emphasis. To the extent that rationality is perceived to be a positive function of mechanical models and formal scientific reasoning – as distinct from Gestalt-like, intuitive modes of discovery – the left brain is favored over the right. It is “fact smart” and linear while the right brain is better suited to process ambiguity and nonlinear thought systems. The right side is associated more with systemic reasoning, in which the whole is more than the sum of the parts. By contrast, the left brain is tightly focussed and confident about what it can know and manipulate. It is superior for purposes of controlling a particular problem or opportunity. The right brain is more tentative and broader in the attention it pays to relationships between people, society, natural systems, and the world at large. An environmental scientist might conclude that the right brain is more deeply engaged in the development of ecological worldviews (e.g., the forest), while the left brain is better at taxonomically and analytically understanding the biotic and abiotic components that make up an ecosystem (e.g., the trees).

Supporters of McGilchrist’s theories are concerned that the left side of our brain is slowly “colonizing” our experience of the world, to the detriment of the right brain’s less articulate counsel for greater synthesis of disparate facts, ideas, and intuition – all needed in order to arrive at a deeper and more comprehensive view of accelerating social, technological, and environmental changes, and their unintended consequences. The patterns of attention that build our understanding of the world are not processed symmetrically by our brain hemispheres. In fact, the asymmetry of the brain hemispheres is one of the significant findings of contemporary neuroscience. For example, all social mammals have a right hemisphere that is larger and heavier than their left hemisphere (McGilchrist). But the most telling asymmetry is not physical; it is the differential capacity for integrating information and the ability to entertain multiple points of view. Although gross simplification is a real problem in interpreting brain functions, some generalizations are possible, albeit not incontrovertible. The right brain appears to be dominant for processing music, visual imagery, spatial perception, facial recognition, and perhaps most importantly, recognizing and dealing with ambiguity. The left hemisphere tends to be dominant for language, math, and what one might broadly describe as academic approaches to knowledge (e.g. logic). Although the hemispheres clearly collaborate in many if not most ways, the subtle ways in which they compete may strongly influence how our worldviews develop and solidify.

### **Implications for Environmental Thought**

Environmentally, one might theorize that left brain dominance results in a tendency to reduce the natural world to a set of natural resources that can be categorized, classified, and controlled as useful objects to be efficiently exploited by the dominant species. The sustainability of resource exploitation would not be of major concern because the focus of attention in the left brain would be on short-term, quantitatively-determined goals of efficiency and growth. To be sure, left brain dominance might contribute logical solutions to sustainability problems, but the incentive structure would remain one of near-term resource extraction for the benefit of the dominant species or individual. Alternative conceptions of maintaining a “web of life,” or a sustainable biosphere would be more at home in the right hemisphere. So would the idea of sustaining whales.

The question that occurred to me long after peering into the eye of that magnificent cetacean was what was the whale’s brain processing as it gazed at me? Did I appear to be some clumsy alien with a bubble machine on my back? Was I viewed as a slow-moving invader from the terrestrial world looking for seafood? Or was I a fellow sentient being seeking a soulful connection? I concluded that the whale must have at least been very curious about me. At first,

it must have followed me cautiously as I followed the mother and calf, using its left brain hemisphere to monitor my underwater movements and behavior, while relying on its right hemisphere to scan the wider ocean for possible threats or opportunities within its full range of attention. At some point, it probably concluded that my intentions were benign, perhaps even friendly, and closed the distance between us. When I turned around in momentary shock, it immediately conveyed calm reassurance by slowly scanning my face and maintaining its stillness in the water. When we fixed eyes, the nonverbal message I interpreted was: “we are engaging in respectful intelligent communication.” Was this merely projection on my part? An anthropomorphic defense mechanism? An imagined fantasy induced by past accounts of other people, who became entranced by encounters with dolphins and whales? All I can say objectively is that the connection was deeply felt and compellingly real as a form of communication. It was an interspecies connection unlike anything else I’ve experienced, even with my favorite pet dogs and cats.

But there is a deeper question that begs to be asked: Did I inevitably interpret the whole encounter through the filter of my ecological worldview? And was that worldview in some way the product of greater reliance on my right brain processing functions? Or was that greater reliance a *result* of ecological interests that somehow caused or “exercised” the right brain to be more active? Or was it some of both?

The evidence is that both processes are occurring, simultaneously. In McGilchrist’s words, “Our experience of the world helps to mold our brains, and our brains help to mold our experience of the world” (p. 245). If he is correct, those of us with strong interests in environmental protection and encounters with nonhuman beings are stimulating *and* relying more on our right brains, while those who still embrace the industrial revolution and the goal of economic growth without limit are more engaged by the left hemisphere. The industrial revolution is for McGilchrist the great divide in western history in which left brain dominance achieved its seductive sway over human development. It substituted straight lines for nature’s nonlinear design, creating a world designed by and for humans, relying primarily on the processing of the left hemisphere. In a remarkably brief time, human existence has been transformed by:

a combination of urban environments which are increasingly rectilinear grids of machine-made surfaces and shapes, in which little speaks of the natural world; a worldwide increase in the proportion of the population who live in such environments, and live in them in greater degrees of isolation; an unprecedented assault on the natural world, not just through exploitation, despoliation and pollution, but also more subtly, through excessive ‘management’ of one kind or another, coupled with an increase in the virtuality of life, both in the nature of work undertaken, and in the omnipresence in leisure time of television and the internet, which between them have created a largely insubstantial replica of ‘life’ as processed by the left hemisphere... (McGilchrist, p. 387).

Gross generalizations of this type can easily lead to academic disqualification. Clearly, much more is going on here than just the effects of brain laterality. I do not deny that the argument seems suspiciously (simplistically) dichotomous, like the cerebral hemispheres, themselves. I am nevertheless inclined by mounting evidence to think that the hemispheres of the brain are active agents in processing how, and to a troubling extent, *what* we think. If that is true, hemispheric dominance seems genuinely important for understanding the role of the brain in

directing the attention we pay to environmental issues. More importantly, how it processes our experiences and learning into cultural identities and worldviews may strongly influence the sustainability of life on this planet.

It is, of course, not only humans who experience the world through competing hemispheres. One might ask how it shapes the experience or outlook of the nonhuman “Other.” Does brain lateralization in dwarf minke whales affect how they process their experience of encounters with humans? Are there good reasons to believe that they engage their right hemispheres significantly more than do modern humans from western nations? For example, did the whale that chose to observe me closely through its right eye (with its right visual field controlled by the left hemisphere) rely on its right hemisphere to process the overall meaning of the optical information conveyed? Such conjecture can quickly lead to the slippery slope of the mind-body problem, but I remain persuaded that during that sublime period of eye-to-eye embrace, both the whale and I were seeing through our right brains, taking in the mystery, ambiguity, and wonder of an emotionally charged and deeply empathic situation. It was only after the encounter, as I tried to make sense analytically of the elation I was feeling, that I attempted to explain each action and moment of the encounter in some logical way, presumably as confidently re-presented by my left hemisphere.

### **Implications for Environmental Teaching**

As I bobbed on the surface, alone, a zodiac approached with a search party from the far-away boat. I wasn’t lost, but I appreciated the help, though not right away. I worried that I would not be able to regain my composure before my colleagues reached me and began scolding me for being a foolish solo diver. As I was pulled into the zodiac, I began my explanation but gave up with embarrassment that I could not recount my story without fresh tears and a wavering voice.

As it turned out, my wife and colleagues had experienced their own emotional connections with whales much nearer to the boat and chose to forego any teasing about about my obvious sentimental weakness. Still, it took a long time for me to recount the experience in any detail to friends and colleagues back home, partly because the feelings embedded in the encounter were still too strong to permit a matter-of-fact retelling of the story. It took many years before I dared use the whale encounter in any of my classes. When I finally relented, it occurred to me that the whole episode was a troubling commentary about the state of science-based environmental education, or at least about the way I was teaching my annual marine environmental studies course. Nothing before or since has transformed my environmental understanding as deeply as that encounter in the Ribbon Reefs. Why then was I so reluctant to share it and incorporate it in my teaching?

The answer I eventually settled on was that telling the full story undermined my core identity as an environmental scientist and risked lowering my academic status in the eyes of some students and many of my closest faculty colleagues. In essence, the most teachable moment in my life was not available for classroom use because at its core it was unscientific and would be seen as a classic case of losing objectivity during a wave of emotion. In retrospect, I suspect that my left brain was facilitating too much of my thinking.

Today, I use the whale encounter without hesitation whenever I want to discuss the limitations of science and what could be called scientific materialism. It is also one of my favorite entry points for discussion about environmental worldviews and human relationships with the nonhuman “Other.” I’ve even featured the encounter in a new film that I’ve produced, entitled “Gone With

the Web.” And for the past 18 years, the whale encounter has been a major inspiration for an experiential learning-based travel course that I offer each May, called the “Palau Expedition.”

Now I have embarked on a research venture to better understand how neuroscience figures in the epiphany I had with the whale. The research clearly lies far outside my areas of training and expertise, and the risk of pseudoscientific conclusions remains great. Still, I am fascinated by what the neuro literature reveals about the environmental worldviews that have shaped much of my adult life. And I like the fact that the words *mystery* and *awe* are now prominently part of my vocabulary of science, as amended by conscious efforts to exercise my right brain. I no longer care that some students and colleagues find my hybrid embrace of science and intuition confusing or illegitimate. I find new insights in sociologist George Homan’s observation that “to overcome the inertia of the human intellect, it is sometimes more important that a statement be interesting than that it be true.”

Truth, for me, arises from two distinct and ultimately incompatible ways of thinking, each provided by brain hemispheres that must function interactively in order for our species to survive. Just about everything our brains do involves both hemispheres, but the way in which they process information differs, resulting in these binary features of thought. Even to consider such an argument will be threatening to many scholars who pursue the goals of absolute, unitary truth and objective knowledge. In my case, it took an encounter with a whale to open my mind to such arguments.

Because some of these discoveries in neuroscience appear to have profound implications for how people relate to the natural environment and, more specifically, how they as social animals relate to the “Other,” this topic has become a small but important part of my teaching strategy. While I recognize the very real dangers of oversimplification in dealing with such topics, I think it is time for ES professors to consider the possibility that environmental solutions and problem-solving should include discussions about the binary features of brainpower and how it helps shape environmental issue frameworks and worldviews. In particular, claims about increasing reliance on left brain processing in western societies need to be critically examined and assessed for the possible role brain lateralization plays in environmental perception and decision making.

“If I am right, that the story of the Western world is one of increasing left hemisphere domination, we would not expect insight to be the key note. Instead, we would expect a sort of insouciant optimism, the sleepwalker whistling a happy tune as he ambles towards the abyss.”

— Iain McGilchrist, *The Master and his Emissary* p. 237

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