

# Experience and Big History

Rich Blundell

Let us then suppose the mind to be, as we say, white paper, void of all characters, without any ideas: How comes it to be furnished? Whence comes it by that vast store which the busy and boundless fancy of man has painted on it with an almost endless variety? Whence has it all the materials of reason and knowledge? To this I answer, in one word, from EXPERIENCE.

—John Locke 1690

I believe that the nature-based narrative of Big History presents a new, emergent and profoundly important learning opportunity for humanity. However, I suspect that the prevailing modes of formal education, and perhaps the learning paradigms behind them, may be inadequate to deliver on this potential. My goal is to develop practical improvements in the way Big History is taught and communicated by arguing for the *lived-experience* to go hand-in-hand with the intellectual dimensions.<sup>1</sup> Therefore, I argue for the value of *experiencing* Big History as opposed to only *knowing* it.

## *Step One: Resurrect EXPERIENCE*

My first order of business in this task is to resurrect the primacy of experience. When John Locke penned the above hypophora, in *An Essay Concerning Human Understanding*, Enlightenment science was still in an early formative stage.<sup>2</sup> His proclamation that experience should be the root of all knowledge production was intended to be a founding principle for science. It is now astounding to realize just how far we have departed from his experiential commandment. To make this point, ask yourself: *How much of what is scientifically known can I also claim to have personally experienced?* There are, of course, multiple ways of knowing. But how much do we, the researchers, teachers and writers of Big History, actually *live* the familiar concepts of physical, biological, social and cerebral emergence that drive the Big History curriculum?

I wonder about the consequences of our vast accumulation of intellectually known yet not lived knowledge. Might this disconnection between what is known and what is experienced contribute to latent injuries in psychological and sociocultural domains, and perhaps to even the natural crisis of the Anthropocene?<sup>3</sup> And could Big History provide an analogue for experiencing the broad sweep of scientific and humanistic knowledge in a way that helps heal these injuries? These are questions that I explore in this essay. I am making the claim that there are new, emergent and under-appreciated reasons for having first-hand *experiences* of our natural cosmology that are greater than merely *knowing* the facts of cosmic evolution. To move forward, we will first need to recommit to Locke's 'EXPERIENCE' as the foundation of knowledge.<sup>4</sup>

We can learn from any experience, and all experiences change us in some way, but I wish to focus here on those that are both educational and *transformative*. A 'transformative experience' stands out as personally impactful: It is big, memorable and durable enough to carry forward and shape subsequent experience. This reciprocal nature of a transformative experience is fundamentally a constructivist process – the ideal of American educational philosopher John Dewey. He, and others, argued that education should ultimately be about cultivating a fulfilling life, which, in turn, sets us up for future erudition and experience.<sup>5</sup> Thus, a truly transformative educational experience can usually be recollected to a specific phase of learning, or even a moment, that marks a substantial shift in the way one sees, relates to and comes to be in the world. Big History has the potential to elicit these moments.<sup>6</sup> The challenge here is to understand how a transformative experience of Big History becomes structurally embedded in cognitive identity structures, and thus part of the everyday narrative of one's lived-experience.

### *Step Two: From EXPERIENCE to Knowledge*

How can a Big History experience become embedded knowledge? In order to distinguish a specific kind of learning, with the attendant qualities that I am arguing for, I enlist the notion of *tacit knowledge*. The physicist-turned-philosopher, Michael Polanyi, proposed the concept of *tacit knowledge* in 1958.<sup>7</sup> He wrote that tacit knowledge is intrinsically '...

hard to formalize and therefore difficult to communicate to others ... deeply rooted in action and in an individual's commitment to a specific context', and that it '... consists partly of technical skills [and partly] of mental models, beliefs and perspectives so ingrained that we take them for granted and cannot easily articulate them'.<sup>8</sup>

Polanyi's philosophy of tacit knowledge points to a way of knowing that is rooted in lived-experience. In other words, to acquire tacit knowledge, one must *experience* something first-hand. The intrinsic relationship between personal experience and tacit knowledge then led Polanyi to focus on the personal processes of discovery that one must engage with, in order to acquire tacit knowledge. He wrote that:

To hold such knowledge is an act deeply committed to the conviction that there is something there to be discovered. It is personal, in the sense of involving the personality of him who holds it, and also in the sense of being, as a rule, solitary; but there is no trace in it of self-indulgence. The discoverer is filled with a compelling sense of responsibility for the pursuit of a hidden truth, which demands his services for revealing it. His act of knowing exercises a personal judgment in relating evidence to an external reality, an aspect of which he is seeking to apprehend.<sup>9</sup>

Here, Polanyi is acknowledging the recursive power with which a tacit understanding can become entwined with self-identity and inspire one to learn more. He believed that such tacit knowledge becomes most useful and most powerful when it is *indwelled*, as opposed to being retained as just explicit knowledge. This is how Polanyi thought tacit knowledge manifests itself within the learner. He wrote: 'To interiorize is to identify ourselves with the teachings in question, by making them function as the proximal term of a tacit moral knowledge, as applied in practice.'<sup>10</sup> Thus, he implies that when knowledge becomes tacit, it becomes embodied; tacit knowledge is knowledge lived. And, because tacit knowledge resides very close to the *self*, it can activate a moral component that is apt to be expressed through character and action. In other words, we are more inclined to act morally based on tacit knowledge than on conceptual knowledge. Tacit knowledge has elements of ethos and agency that explicit knowledge lacks.

By enlisting the notion of tacit knowledge, we may now meaningfully ask: What if the 'teaching in question' is natural scientific cosmology? And what identity-level, moral dimensions emerge from engagement with a Big History curriculum? My research suggests that a natural cosmology is more inclined and better equipped to meet the

challenges of the Anthropocene than a supernatural cosmology or one disconnected from nature, as in Western culture.<sup>11</sup> This prompts a question of particular interest:

*How might a personally transformative experience of Big History be materially expressed in culture and the biosphere?*

Writers in the field of knowledge management have refined the notion of tacit knowledge to be ‘personal knowledge embedded in individual experience and involves intangible factors such as personal belief, perspective and value system’.<sup>12</sup> A recent empirical study identified three primary facets of tacit knowledge as: ‘mastery of the big picture; expert networks; and social skills’.<sup>13</sup> Any teacher of Big History will appreciate a big-picture, context-dependent, networked and perspective-oriented concept. All of these capacities are important to Big History knowledge. But, what is often overlooked, or even avoided by more quantitatively oriented colleagues, are the many other vital human parts of tacit knowledge: the personal, subjective, constructed, values-laden and experience-bound ways of knowing Big History. My argument is centred on developing these qualities, because, if we do not appropriately engage these powerful capacities within the human spectrum of knowing, then we will fail to deliver on the full promise of Big History in human domains.

The challenge then is to find a way of transferring Big History personal experience, ostensibly as tacit knowledge, so that it can be managed and transmitted as information – from the interior domain of psychology to the material domain of culture.<sup>14</sup> This is what can make our experience ‘matter’ in the world – literally as well as metaphorically.

### *Step Three: A Cybernetic System for Big History’s Tacit Knowledge*

The question now is how tacit knowledge of Big History can propagate through personal, social, cultural and natural domains. This is the focus of my doctoral research. In order to understand the complexities and challenges involved, we must first consider the fields of scholarship that need to be engaged to trace how an experience, a phenomenon of the mind, becomes manifest in the world. First, the experience must become embedded in personal, cognitive structures, and then this ‘thinking’ must find expression, through

individual and collective agency, to have some perceivable impact on the ‘material’ biosphere. To depict how such a cross-domain transmission can occur, I invoke a cybernetic framework.<sup>15</sup>

Cybernetics is the science of how information moves through complex systems. Its origins date back to Plato’s use of the term κυβερνήτης (kybernētēs) to refer to the ‘art of navigation’ when he compared the steering of a ship with the governing of a society.<sup>16</sup> Such principles were later applied sporadically during the development of mechanical devices, as for timekeeping and thermal regulation.

During the rapid technological advancements surrounding World War II, American mathematician and philosopher Norbert Wiener (1894–1964) developed algorithms in order to understand and predict the trajectories of aircraft. In a 1948 book titled, *Cybernetics: Or the Control and Communication in the Animal and the Machine*, he developed the math and models that would optimize estimations of aircraft positions in order to shoot them down.<sup>17</sup>

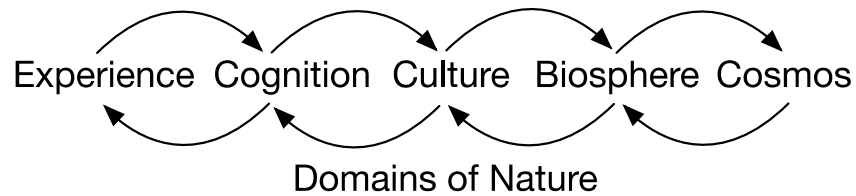
What made Wiener’s formulations revolutionary was how they effectively bridged the animal-machine boundary. By accounting for pilots’ decision-making (animal), in relationship to aircraft (machine), he established information as being the lingua franca of organisms and machines. This work opened new understandings of how component biological and mechanical systems could interact in ways that maintained control of larger systems. Later cyberneticists developed an even more transdisciplinary scope and the *Systems Theory* that emerged has since been applied to understand, model and design systems of any kind: physical, technological, biological, ecological, psychological and social, or any combination of these.<sup>18</sup>

Cybernetics then offers a way of understanding how information travels across systems of seemingly disparate components. Given the scope and subject matter of my research on transformative experience, a subjective phenomenon, I’m primarily interested in the qualitative, as opposed to quantitative, aspects of cybernetics. My analysis, then, concerns how information (as opposed to energy) moves through a system and how that information, or tacit knowledge, functions to influence or steer actions toward system-level goals – in other words, to ameliorate negative aspects of the Anthropocene.

Ecologist and philosopher Gregory Bateson (1904–1980) did much to advance cybernetic understanding between psychology and the biosphere. In *Steps to an Ecology of Mind* (1972), he wrote: ‘After all, the subject matter of cybernetics is not events and objects but the *information* “carried” by events and objects’.<sup>19</sup> The universal nature of cybernetic principles are clear to those who think deeply and ecologically, regardless of their specialization. As a result, cybernetics tends to bleed into various domains and be independently developed across disciplines. An example of such consilience can be seen in the work of the celebrated historian William McNeill (b. 1917), who arrived at cybernetic understandings after decades of contemplation about human history.

Late in his career, McNeill surmised that humankind exists within what he characterized as three perpetually interacting spheres: 1) the material and energetic sphere, 2) the biological sphere, and 3) the semiological sphere – words, images and other symbolic communication. In an essay in which he announces his move away from what he deems an outmoded ‘Western Civ’ model, McNeill intimates a cybernetic hypothesis when he proposes that the ‘least material of these equilibria – the semiotic – had an almost magical power to alter the others.’ He concludes: ‘... reliance on webs of communication to define how human groups affected one another and the environments in which they lived ... has the virtue of emphasizing the semiotic equilibrium that I believe plays such a commanding role in provoking historical change.’ By identifying the flow of semiotic information as the primary agent of change across disparate domains of human affairs, McNeill is enlisting cybernetics (in principle if not by name).<sup>20</sup>

While the sequence for extrapolating personal experience to the world at large may be intuitive, even obvious, it is extremely hard to research through conventional reductionist and specialist methods of scholarship. So, in order to pursue my thesis that personal experience can come to matter in the world and ultimately affect the Anthropocene, I needed to build a cybernetic framework with sufficient scope to span the gap between personal experience and the biosphere. Because the subject matter of Big History covers the entire universe, I also needed to extend the system to include the cosmos. I developed this model as follows:



This diagram represents a simple cybernetic framework that can serve as a conduit for the transformative learning experiences of Big History. This is the path by which Big History tacit knowledge can move across domains. Each domain in this model represents an overlapping milieu of semiotic (and therefore energetic) exchange. The overall system is an emergent manifestation of nature. Within nature, from left to right, and in accordance with Locke’s axiom, the system begins in the personal experience (of Big History). Personal experience then shapes the cognitive structures of the experiencer and effectively moves the tacit knowledge one step right, into the overlapping domain of *Cognition*. *Culture*, as the emergent collective expression of individual psychologies, then has Anthropogenic impact in the *Biosphere*. To complete the cybernetic system the domain of *Cosmos* refers to the holistic, universal ordering of energy and information into universal patterns. The dual arrows indicate that all transactions between the domains are two-way exchanges. Because each domain represents a systemic component with a diffuse range of complexity that is a part of an all-encompassing natural system, information can circulate within each domain, as well as through the system as a whole. This stepwise progression is capable of supporting a discussion across all the domains of relevance to my thesis, from personal experience to culture and beyond.

This model is, of course, a simplification, since there are manifold ways to present a conceptual system that spans all of nature. I devised this model to suit my research, by placing the relevant domains in close enough proximity so as to see how they might exchange information. In other words, this configuration allows me to map a pathway of propagation through which the teachings of Big History can migrate across the domains of culture and nature.<sup>21</sup> There are myriad influences and emergent feedbacks playing out within and across the cells of circularity. Similarly, the step-wise progression suggested by this graphic is a compromise, for the sake of clarity. Complex cybernetic systems need not, and surely would not, adhere to such a linear and orderly sequence. Nevertheless,

this configuration allows me to map a pathway through which the personal and cognitive impacts of Big History can propagate from the domain of personal experience to culture and beyond. This is a theory-to-practice (*praxis*) model for Big History communication.

This schema is essentially an expression of *Philosophical Naturalism*, which mandates that a whole system must be a manifestation of natural, emergent complexity. Nature is not a category, it is *the* category. In such a worldview, even something as pernicious as human imagination is permitted, because such phenomena arise from natural, neural networks. Thus, although external supernatural phenomena themselves are incommensurable within this system, what one might label as supernatural is subsumed as ‘natural’, in that it is an expression of natural. human imagination.<sup>22</sup>

Finally, I propose this as a *second-order* cybernetic system. Such a system assumes that humans play a part in the functions, goals and directions of the entire system. Despite how it sometimes appears to us, there are no outside observers in a second-order cybernetic system.<sup>23</sup> If an engagement with Big History brings about a transformative experience, then, by the principles of second-order cybernetics, the transformation will propagate through the entire system. In this way, the system and the experiencer come to share something fundamental, and this ‘reflexivity’, I propose, is the foundation for my argument. According to chemist and complexity theorist N. Elizabeth Hayles:

*Reflexivity is the movement whereby that which has been used to generate a system is made, through a changed perspective, to become part of the system it generates.*<sup>24</sup>

With *natural* reflexivity as the transformative experience and cybernetics as a conduit for Polanyi’s tacit knowledge, Big History can be expected to impinge on the larger system in fundamental ways. This further aligns the framework with Polanyi’s claim that tacit knowledge provides:

... a means of making certain things function as the proximal terms of tacit knowing, so that instead of observing them in themselves, we may be aware of them in their bearing on the comprehensive entity which they constitute. It brings home to us that it is not by looking at things, but by dwelling in them, that we understand their joint meaning<sup>25</sup>

Polanyi’s argument supports the main thrust of my thesis by stating that personally experiencing oneself as a participant in a system will come to bear on the nature of the



entire system. As a notion in complexity theory, this is the moment that a cybernetic system becomes a second-order cybernetic system. As a lived experience, this is the ‘epiphany of reflexivity’ that happens when one accepts that they are participants in a larger system. This is the moment of self-nature unity, akin to the ‘affective relational identity’ of Baruch Spinoza (1632–1677) and the moment of ‘entanglement’ of science sociologist Bruno Latour.<sup>26</sup> Experiencing oneself as the cosmos, affects the cosmos.

#### *Step Four: Integrate Narrative Identity*

A final step in understanding how a transformative experience with Big History can manifest in culture, and beyond, is to consider the fundamental role of *narrative* in human affairs. Narrative is the basic way that humans make sense of the world. *Narrative theory* refers to the constellation of understandings by which humans lead storied lives, both individually and socially.<sup>27</sup> Evolutionarily speaking, humans are compulsory ‘meaning-makers’ and provide that made-meaning through narrative.

This understanding is the basis of *narrative psychology*, which social psychologist Dan McAdams claims has advanced on the shoulders of story to such a degree that narrative approaches ‘have moved to the center of the discipline’.<sup>28</sup> We then have *narrative consciousness theories* as articulated by neuroscientist and neurobiologist Antonio Damasio when he writes: ‘Consciousness begins when brains acquire the power, the simple power, I must add, of telling a story’.<sup>29</sup> And *narrative identity theory* draws explanatory power from the idea that human beings function according to an ‘internalized, evolving, and integrative story of the self’.<sup>30</sup>

Narrative is also highly portable. In other words, the personal narratives that we craft to define ourselves and to live by are reflected in the cultures we inhabit. Narrative cognition and culture are fractally integral. The highly personal, identity-defining, transportability and uniquely human capacity for narrative meaning making makes story an exceptionally good lens through which to understand humans.<sup>31</sup> This is also why I employ narrative as the way to structure the information contained in tacit knowledge.

Because experiences, especially those that stand out as transformative, invariably play out as personal stories, the methodology of narrative inquiry can provide valuable insights for understanding experiences of personal transformation.<sup>32</sup> Narrative inquiry is a qualitative method that holds story as ‘...a portal through which a person enters the world and by which his or her experience of the world is interpreted and made personally meaningful’.<sup>33</sup> Methodologies of narrative inquiry are a way for making sense of human experience in terms of first-hand personal accounts. This is the rationale for the narrative inquiry method use in my research and in this essay. If one is going to make a fully formed argument about the impact of personally transformative experience, it is appropriate, indeed required, to use first-hand accounts

I have thus presented a framework for understanding how a transformative experience of natural cosmology can propagate across domains to ameliorate the Anthropocene. Personal experience, structured narratively into tacit knowledge, is carried as information, through a cybernetic conduit and across the *Domains of Nature*, from *Experience* to *Biosphere*. I will now present a first-person account that demonstrates this framework in action and in nature.

*Step Five: Illustrate a Lived-Experience of Big History*

I believe a leaf of grass is no less than the journey-work of the stars,  
And the pismire is equally perfect, and a grain of sand, and the egg of the wren,  
And the tree-toad is a chef-d’œuvre for the highest,  
And the running blackberry would adorn the parlors of heaven,  
And the narrowest hinge in my hand puts to scorn all machinery,  
And the cow crunching with depress’d head surpasses any statue,  
And a mouse is miracle enough to stagger sextillions of infidels.

—Walt Whitman, *Song of Myself*, 1855.<sup>34</sup>

The word ‘human’ is a cognate of ‘humus’ (the organic part of soil). So, at least since antiquity, and surely long before, humans have held a relic sense of being ‘from the soil’. It therefore seems fitting that my earliest memories emerge from my relationship with dirt. The glacial sands, fine clays, rounded pebbles and organic detritus that I dumped out

of my pockets each night divulged where I had spent the day playing – in the swamps, woods, cranberry bogs or sand pits of eastern New England. Right now, even as I write these words, I can taste the earthy grit between my teeth, smell the sweetness of the white pine duff, feel the soft humus packed under my fingernails, and *know* the damp chill of bog-wet socks in my toes. My deeply sensual immersions in a home ecology prepared me for many transformative epiphanies later in life.<sup>35</sup> My lived experiences have joined me to a planet and profoundly deepened the way I now see and act in the world.



Image 1: Rich Blundell and Sarah the goat at their family farm  
Duxbury, Massachusetts in the 1970s.

*Source:* Photographs by Richard Blundell.

The oikos of my youth was a small family farm, with its entourage of goats, pigs, chickens, cows and other domesticated animals. My daily activities included mundane chores like feeding, milking, mucking-out stalls, and lugging water buckets. But I also have a vivid recollection of a more dramatic event. Early one winter morning, I helped a dairy goat, named Sarah, who had been struggling all night to deliver a breached kid. It was an intense, gruelling, heart-wrenching and bloody experience. Because of it, I can now duly report that assisting in a mammal birth instils a certain kind of empathy in an adolescent boy. I learned that Sarah's blood is as warm and red as my own, that we both need nourishment, and that we share fears, comforts and other social instincts. Sarah and I remained close friends until her death many years later.

As a farm boy, I didn't make it to the beach on the other side of town very much and so had little interest in the sea. But that changed radically soon after I started attending high school, which was located on the coast. On a day that a friend and I skipped classes, we found a small skiff that had washed ashore behind the school. We bailed it out, fixed up the holes, and rowed it out onto the bay. When we came across some small buoys, we pulled the ropes to see what was at the other end. I'll never forget the first time I heard the slapping of a lobster in a lobster trap. I remember saying: 'So *that's* where lobsters come from!' I also remember being instantly enthralled by all of the other sea creatures, the by-catch, that comes up in a trap. This discovery of the sea accounts for both my dismal grades and poor attendance record throughout high school. As soon as I could, I restored my own boat and promptly spent more time tending traps than attending class. I also soon discovered the larger stretch of the Atlantic to the east – Cape Cod Bay.



Image 2: Rich Blundell lobstering on Duxbury Bay, Massachusetts.

*Source:* Photograph by Don Merry

Of course, growing up in a coastal New England town, it did not take long before I found myself on the well-plied course to commercial fishing. As a small-scale, commercial lobsterman, I also had a source of income. But I was a slow fisherman, because I spent a lot of time contemplating the flora and fauna New England's neritic zone. Each trap landing on the gunwale seemed to contain an entire cast of characters, caught in the act of living their benthic lives. The cool wetness, smelly mud, slippery

seaweeds and tactile sensations of spiny sea creatures in my hands helped me cultivate a lived-relationship with the ecology of the bay. Over the years, I developed an internal clock, so set to marine rhythms, that at any given moment, no matter how far inland I found myself, I believed I could tell you the comings and goings of the tide.

I also learned what it meant to make a living from the sea. So, in search of ‘more’, I expanded my operations to other commercially viable species. This brought me to fishing grounds further offshore. I went from lobsters to striped bass and eventually out to the blue waters north of Cape Cod, where there was an active tuna fishery. It was while tuna fishing on Stellwagen Bank, perched far out on a harpooning pulpit, that I caught my first and only whiff of whale breath. The humpback surfaced just below me and timed her blow perfectly to envelop me in a briny mist. Despite the heavy scent of sand eels, I remember something distinctly mammalian about her cetacean exhalation. It was a smell that reminded me of the bleats of my dear old friend, Sarah the goat.

New England has a long commercial fishing history, and anyone who participates in it is aware of the impacts of overfishing. Yet, despite my knowledge of troubled fisheries, I was also immersed in a commercial fishing culture. So, I kept fishing, that is, until I caught my first bluefin tuna.

Just hooking a tuna is an extraordinarily hard thing to do. They are smart and elusive. The best tuna fishers acquire an obsessive mind-set – an intense awareness and constant questioning of detail. You refine your sensory landscape for location, timing, techniques and tactics. You decide the kind, size and shape for the chunks of bait, how to place them on the hooks and space them, the depth to set them at for water temperature, currents and even the sun’s angle.<sup>36</sup> Some boats go an entire season without getting a single ‘fish-on!’ And then, getting a reluctant thousand-pound fish into a small boat is another challenge, one requiring less nuance and more brute force.

Once the animal is on deck, the first order of business is to bleed the tuna by slicing the veins beneath the pectoral fins, then the commercially meagre fins are hacked off. Normally, a small boat without refrigeration quickly sells the dismembered carcass to a processor, a ‘buy-boat’, which drifts on the periphery of the fishing fleet. A boat with a catch to sell pulls up alongside just long enough to transfer the torso via a davit hook. A

hefty check is written, handed off, and the crew heads back to port to celebrate over beer and a ballgame on the television.

But, on the day I caught my first (and last) tuna, we missed the buy-boat. This meant we had to haul the fish on deck and rush back to the dock, because, the fresher the catch, the more valuable the meat. As we headed for port, we were in a celebratory mood, especially me, because I felt responsible for this catch. It was my chumming method, my hook-setting technique and my knowledge of tuna feeding behaviour that had made the trip a success. My skill had landed this tuna on the deck and many congratulatory pats on the back from the crew. Perhaps the good cheer helped suppress any deeper questions about the rightness of the activity. In that moment, it just felt good to be responsible for such profit.

After we tied up to the dock, the crew prepared the davit to haul the tuna up to a waiting freezer truck, while I kneeled down beside the tuna to wrap a hitch around the tail. In the rush back to port, I had not paid much attention to the fish. So, this was the first time I had actually come into physical contact with it since landing it on deck. As I smelled it, and felt its cool, slick, surface in my hands, I began to sense the rise of something repressed. Suddenly my mind flooded with recollections of my time at the gunwale of my old lobster boat, with my hands on all those creatures, and getting lost in the scents and sensations of the sea. As I got drawn deeper into the presence of this massive blood-drained being before me, my guard went down. I was suddenly *experiencing* the reality of a bluefin tuna. Even with its blood-drained and the indignation of having its fins hacked off, this fish was still a truly awesome creature – 800 pounds (363 kilograms) of exquisite, solid, streamlined muscle. Kneeling beside it, I slid my hands forward, skirting the stiff little yellow finlets that line the dorsal and ventral edges of the peduncle. I followed its shape forward along its silver and blue fusiform outline. Then I let my finger follow the gentle curve of the lateral line: a black undulation that arcs like a charcoal pencil stroke along the sides of all schooling fish.

The lateral line, I would later learn, is actually an incredibly perceptive sense organ. Packed with neural circuitry, it allows for that graceful, emergent, synchrony seen in the way schools of fish move as one. It detects minuscule pressure differentials in the space

between the individuals of the school, allowing them to choreograph instantaneous movements with such efficiency that the entire system takes on a new, singular, emergent form. In other words, fish participate in a kind of social emergence. It should perhaps be more rightly thought of as a highly evolved, social communication apparatus. Furthermore, in a predatory species like the bluefin tuna, the lateral line also lets them sense the tiny vortices left behind by swimming prey. In this way, a bluefin can track a meal by following the lingering, swirling imprints of movement through an otherwise dark and uniform space. Research is also revealing the lateral lines' function in sensing and propagating electromagnetic fields.<sup>37</sup> Thus, we learn that fish communicate complex, unseen social information through the medium of the sea; a cybernetic relationship between fishes and their world that would have surely delighted Norbert Weiner.

What I am trying to convey is how intellectual knowledge about tuna natural history can coalesce with an emotional experience to produce a holistic new lived-experience of daily encounters, one that is drastically more than the sum of its parts. Big History, I believe, is superbly suited to this kind of learning, but only if we who teach it value the lived-experience and cultivate it.

As my hand continued to sweep forward over the gill slit, across the operculum, and down the taper of its snout, I found myself looking directly into the tuna's immense eye. I was halted by its voluminous, gelatinous depth. I was especially drawn to its colour, a living, translucent obsidian-black. But at the moment my eye met the tuna's, it suddenly faded to a lifeless, cloudy greasy-grey – as I became aware of this life, it drained away. I sat there, while dreadful sense composed inside my mind. It seemed this tuna had waited for my acknowledgement to communicate something. The culture of commerce, so palpable a moment before, now entered its proper context. The moment I acknowledged myself, in the tuna, something drained away from me as well. But I had received the message. I quit fishing at that moment and decided to study marine biology instead.<sup>38</sup>

Why am I telling this story? It is not because I think that Big History will lead to the same experiences but to let the reader know that I know what transformation in the face of nature feels like. And I also know that Big History has the capacity to support its own constellation of epiphanies. In my case, my feelings of culpability had swung a full 180-

degrees in a single transformative moment communicated by a fish. I went from the one responsible for celebrations, through reminiscence of deep experiential affections, to the realization and release of a burdensome moral contradiction. I could calculate the profit of a catch. But a quantitative value without its qualitative counterpart is a missed opportunity. The tacit knowledge that I developed for the lifeways of the tuna, which I had been so proud of exploiting, inverted to the acute reality of what I had done with it.

After selling my boat, I ended up in a small marine science program in the Geology Department of Northeastern University in Boston. I had not done well in high school but did flourish as a university student, probably because I was able to draw on my lived-experience in the glacial deposits of New England. Experience and knowledge again enhanced one another. I developed an affinity for reading rocks and landscapes, but geology also opened my eyes to just how small my sense of history was. I realized that while I could *know* the geologic timescale objectively, I could not truly *experience* it subjectively. Humans simply have no capacity to grasp 4.6 billion years. But it did support of my understanding of the critical difference between *knowing* and *experiencing*.

During one palaeontology class, I had what could be called an intellectual epiphany. The professor was explaining how the fossil record of the Late Jurassic, around 150 million years ago, indicates that a small carnivorous dinosaur called Archaeopteryx evolved new strategies. It had developed flexible scales, perhaps for improved insulation, which may have also conferred an advantage for movement. This adaptation may have helped them chase prey or escape predation on the ground by jumping into the forest canopy, which led to an early form of flight. It provided an evolutionary advantage that, over time, led to the emergence of feathers and modern birds.

Like other students in the lecture hall that afternoon, I was taking notes, but when I looked up from my notebook, something had inexplicably shifted. I overheard my internal dialog negotiating a new insight: ‘Dinosaurs became birds ... Dinosaurs *became* birds ... Why have I never thought about this? ... These stories are connected ... No, they’re the same! ... There might be other stories I’m overlooking.’ After class, my thinking spun at an accelerating pace. Why had I assumed things had always been the way they are now? In my unexamined world, birds always existed. I was not just



learning. Now, I was *participating*, in conceptual knowledge production by constructing new meaning. ‘If there was a time before birds, there was a time before humans. So what’s the story, what’s my place in it, and where will it lead...?’

At the age of 21, I started to realize that I’d been living in a historically impoverished world. My studies in geology had led to new explorations of chemistry, biology and ecology. The combination of geology’s vast new timescale, biology’s intricate narratives, and ecology’s ability to connect it all together highlighted the relationships between things, beings, ideas, and myself. Suddenly, the world was a giant mystery, and I was a detective trying to understand how it all came to be. I paid even more attention to nature, saw the world differently, experienced it more richly, and could relate to it in profoundly personal new ways. I began to embody Polanyi’s predicted side-effect of tacit knowledge – the impassioned ‘pursuit of a hidden truth’. It would find expression in two-decades of wayfaring around the globe.<sup>39</sup>

The first footprints I left outside of North America were in the volcanic dust of East Africa. I joined a remote field station that hosted American undergraduate students wanting field experience in wildlife conservation. I tutored them in geology and biology, and organized camping expeditions up and down the Great Rift Valley. These were not tourist safaris, but more like sorties into the bush.

The Great Rift Valley in Kenya was a conduit for the early hominin diasporas out of Africa. The region is rich with geologic, biologic and anthropologic treasures. For nearly a decade, I travelled and taught, but mostly learned, throughout East Africa. These terrestrial experiences put me in touch with a great diversity of wild animals and the deep history of my own mammalian past.

Years before, the ocean had gotten in my veins, and so I was drawn back to sea. This time, I sailed as a scientific crew member, aboard the *R/V Westward*, from the docks of the Woods Hole Oceanographic Institute in Massachusetts. The *Westward* was a robust, steel-hulled, ocean-going schooner, rigged for science at sea. Life aboard the *Westward* was a world away from the coastal estuaries and shoaly bays of my youth. Days and nights were spent offshore, along the pale-blue, pelagic plane that marks the boundary of

sea and sky. On passages from Newfoundland to Barbados, we'd sail for weeks, sometimes on the same tack and without sight of land.



Image 3: Rich Blundell lecturing to students on the savannahs of East Africa, 1993.  
*Source:* Rich Blundell.

Standing watch under the sky, I witnessed processions of sun and moon in unbroken arcs from horizon to horizon. I learned to follow the paths of planets and the diurnal migrations of plankton. Day after day on deck also had a way of tuning me to the subtle shifts of wind and the storms they foretell. My time at sea cultivated a keen new capacity for observation. I became aware of invisible salinity regimes, tiny temperature gradients and the tell-tale scent of the Sargasso Sea. I saw Gulf Stream currents transport huge swirling cells of Caribbean ecology northward, as warm core eddies carry complete assemblages of tropical fauna far from home to dissipate and die within the Arctic Circle.

We plunged all manner of sampling devices down through the water column and into the ancient sediments of the abyssal plain. We towed plankton nets with mouths measured in metres and meshes measured in microns. Hauled up from the black abyss, thousands of meters below, they glowed green with bioluminescence – silently following the *Westward* through the dark, like ghost funnels, before breaking the surface and collapsing on deck like wet socks. We'd scoop up a bucket of ghastly and gorgeous creatures to poke, prod and inspect through microscopes in the middle of the night. My

students' science projects required nearly non-stop sampling from about every marine ecosystem and water column between Newfoundland and Venezuela. Twenty years after getting out of commercial fishing, I found myself back at a gunwale, sifting through samples of the benthos and handling surprised sea creatures. But this time it was a different context; I was applying my tacit knowledge from within a qualitative, ecological relationship, instead of from the outside in a quantitative, economic transaction. It was a culture rooted in a different psychology, and thus a different experience.



Image 4: Science aboard the R/V *Westward*,  
Rich Blundell (back right), Georges Bank, Gulf of Maine, 1997.  
*Source:* Rich Blundell.

Over the course of twenty years, I had studied and worked in geology, biology, palaeoanthropology, chemistry, astronomy and ecology. I thought I had developed a fairly complete understanding of the cosmic narrative, albeit one developed via the sciences. But while I had been in the field, a new subject called Big History had emerged from a synthesis of the sciences and humanities. With a comprehensive scope and paradigm-challenging outlook, it seemed like a perfect subject for me to explore. So I started a Ph.D. study in Big History at Macquarie University in Sydney (Australia) in a

modern history department. Once again, I had to develop another human timescale, and a profoundly different, humanistic perspective that goes with it.

Catching up on a vast amount of knowledge from the other side of the two-culture chasm of science and the humanities is a common predicament among Big Historians. Those coming from the humanities have to learn evolution, thermodynamics and relativity, while those coming from the sciences must now study the seemingly endless empires, innovations and social revolutions of human-scale history. What I noticed most was how the social and cultural domains of human history began to carry forward my scientific narrative. Not only did the human condition suddenly have a cosmic context but science also took on a whole new meaning.<sup>40</sup>

Every new fact, scientific or humanistic, was now nestling into my larger framework, where it could mingle and mate with other facts, sometimes overlapping and sometimes far-removed. I saw emergence between otherwise culturally entrenched metaphors.<sup>41</sup> This process can serve lifelong learning, personal growth, and the cultivation of new empathic capacities. My deepest motivation for pursuing this research at all, and for engaging with it as a cultural practice, is to affect this kind of transformative experience at a social level. This is an essential meaning I found in Big History.

Embedded within a Big History curriculum is both explicit and tacit knowledge. Physicists tell us that the atomic products of the Big Bang linger materially in each of us. But ultimately they also imply that the boundary between the ‘self’ and the ‘other’ is illusory. Astronomers tell us that, yes, thermodynamics, as it is presently understood demands that the energy dispersed throughout the Cosmic Background Radiation is destined to cool and annihilate the residual energy of the Big Bang. But imprinted on that dappled pattern are the primordial relationships between temperatures. The cosmos is vaster, more violent, emptier than we ever imagined, but also that vaster still is the pure improbability of the Earth upon which goats, whales and we humans hurtle through the void together. Geologists tell us that we aren’t the first inhabitants on this planet and that the decaying denizens of those earlier eons have much to do with our quality of life today. Chemists tell us that all life shares a common formula and that the elemental iron running in our blood binds us to ongoing nuclear fires in distant suns. Biologists tell us of

our deep kinship with all living things, and that death and time can breed, as Darwin put it, ‘endless forms most beautiful’. Ecologists tell us that energy webs connect it all and that what we do to the bluefin tuna, ultimately, we do to ourselves. Together, science and the humanities make the cosmic narrative personal.

Through my own lived-experience with the biosphere, I have come to understand that I am a carrier of natural systemic information. This is the epiphany of natural reflexivity: we are not exempt from the emergent complexity of nature. We are participants and endowed with the fruits of our participation. Thus, in the all-encompassing second-order cybernetic system of nature, I am a component (an object), carrying my narratives of tacit knowledge (information), gained from my transformative experiences (events) from the biosphere to culture. Nature itself taught me this.

I frame this work in order to ameliorate the Anthropocene. But the Anthropocene is just shorthand for species extinction, global warming and ecological injustice. It is a priority for humanity. It’s hard to image how we will be able to improve any aspect of the human condition without a healthy, thriving planetary ecosystem. And what would be the point? After all, aren’t politics, economies, social justice and sadly, even loved ones irrelevant on a dead planet? Therefore, we need fundamental outward expansion and inward deepening of what human beings identify with. Unlike any other academic subject, I believe that Big History is poised to make this difference. Big History can excel at this – if we are willing to teach it in ways that are both experientially transformative and simultaneously faithful to science, and thus nature.

Our experiences shape our psychology and our psychology shapes the way we lead our lives. We create around us a ‘living culture’ that is in constant transaction with our own and the collective lived-experiences of others. According to second-order cybernetic principles, there is no objective external observer, just internal personal experience in relationship with innumerable feedback-loops. Through this simplified rendering of a vastly complex system of exchanges, we can see how we are connected across all of the *Domains of Nature*. There is nothing radical here besides being explicit and attempting to synthesize these ideas into a practicable form.

## *Conclusion and Implications for Big History*

My goal in this essay was to develop improved praxis for the way we communicate Big History – by expounding upon the integral relationship between knowledge and lived-experience<sup>42</sup> I synthesized concepts from complexity theory to understand how experience could propagate in personal, cultural and environmental domains. I proposed a framework wherein personally transformative lived-experience becomes the cognitive information embedded in tacit knowledge, and transmitted cybernetically as narratives across the *Domains of Nature*, from *Experience* to *Culture*, the *Biosphere* and beyond.

I then populated this cybernetic framework with my own lived-experiences. By providing a few of the turning points on my own pathway to Big History, I attempted to illustrate both the symbiotic and cybernetic relationships between knowledge and lived-experience. Another reason for telling my personal story was to build a case for Big History as a ‘lived-experience’ itself. In doing so, I was able to answer, affirmatively, the question asked earlier: Can Big History initiate and cultivate this kind of transformative learning?

A primary finding of this exercise has been to confirm that *cybernetic complexity is a valid description of reality*. The implication of this for Big History education and communication is to take cybernetics seriously, because it shows that the way we teach Big History will have profound real-world implications. A cybernetic understanding demands that we teach the magnitude of the promise, not just the past. Because of the natural range, depth, scientific credibility and narrative structure of Big History, we can expect its teachings to reverberate cybernetically through the *Domains of Nature*, unlike any other subject.

I conclude this essay by acknowledging that Big History is not alone in its ability to profoundly affect the way we see and interact with the world. There are mystical, religious, traumatic and even mundane experiences that can, and do, communicate disruptive impacts from personal to natural domains by the same cybernetic dynamics I have employed for Big History. However, by approaching the *natural* cosmic narrative from a *humanistic* point of view, Big History has the potential to approach, reveal and

traverse the artificiality of the science-humanities divide. The bridge built by Big History is unique in that it could bring what we know about who we are to bear upon how we may live.

In other words, it is an opportunity to endow human self-identity with a new empathic capacity to make meaning of the Anthropocene and all that we love on this improbable planet. We need to feel ourselves to be part of nature and the cosmos, and not be intimidated into withholding this experience from our students. All knowledge, no matter how specialized, has the potential to impart a personal transformation. Big History has the potential to shift the identity of the learner in fundamental ways, ways that also puts it in alignment with the realities of nature and the ecological crisis of the Anthropocene, which is after all just a symptom of the displacement of culture-psychology-experience from nature.

Based on my own lived-experience, I can't escape the sense and the hope that we have earned the right, indeed the responsibility, to make more meaningful personal sense of this cosmic creativity. Then, through a culture of courageous questioning and a steadfast commitment to science, we may genuinely be able to call it our own and utilize it in as-yet unimagined ways for continued prosperity. If we choose to do so, it would have profound consequences for our self-image as personal and universal beings and, perhaps, inspire us into a whole new positive feedback loop of conscience creative problem solving in the name of human and non-human flourishing.

---

<sup>1</sup> In my essay, I use the term, 'lived-experience', to refer to its formal usage in phenomenological contexts, where it is a central methodological concept that aims to provide concrete insights into the qualitative meanings of phenomena in people's lives. Max van Manen 2004.

<sup>2</sup> John Locke 1690.

<sup>3</sup> The Anthropocene is a term emanating from earth systems science for the geologic epoch we are currently entering. It describes an over-exploited, ecologically damaged and socially uncertain world. In my ongoing doctoral research, and in this essay, I use the term as an umbrella concept, reflecting a persona/cultural worldview disconnected from nature.

<sup>4</sup> I present a more detailed argument for experience-based knowledge in Big History and nature in my Ph.D. work at the Department of Modern History, Macquarie University, Sydney, Australia.

<sup>5</sup> John Dewey 1958; 1998. Philip Jackson 2000.

<sup>6</sup> The assertion that Big History can elicit a transformative experience is supported anecdotally by many Big History educators as well as my own on-going, empirical doctoral research. For example, see Barry Rodrigue 2006: 10.

<sup>7</sup> Michael Polanyi 2012; 2009.

<sup>8</sup> Ikujiro Nonaka 1991: 98.

---

<sup>9</sup> Michael Polanyi 2009: 24.

<sup>10</sup> Michael Polanyi 2009: 18.

<sup>11</sup> My current research analyses the qualities of personal transformation reported by students of Big History and compares them to the cultural-level causes of the Anthropocene. I found them to be highly correlated.

<sup>12</sup> Ikujiro Nonaka and Hirotaka Takeuchi 1995: vii.

<sup>13</sup> Anu Puusa and Mari Eerikäinen 2010.

<sup>14</sup> I have chosen the word ‘transmitted’ here carefully to distinguish it from ‘communicated’ because as we will see, tacit knowledge is known for being difficult to communicate.

<sup>15</sup> I use the term ‘cybernetics’ instead of the more recent ‘Complex Adaptive Systems’ (CAS), because cybernetics retains its an earlier focus on how information flows through and across complex systems. Although I adopt many of the most recent understandings to emerge in CAS, the more limited scope of cybernetics allows me to better address the specific question of how the ideas embedded within a Big History curriculum can have potential ameliorative impact in the Anthropocene. An excellent primer on general systems theory and cybernetics can be found in our anthology in the chapter by Robert Drury King in volume 1.

<sup>16</sup> A good timeline of cybernetics is found at the American Society for Cybernetics 2014.

<sup>17</sup> Norbert Wiener 1965.

<sup>18</sup> Francis Heylighen and Cliff Joslyn 2001.

<sup>19</sup> Gregory Bateson 1987: 407.

<sup>20</sup> William McNeill 2011: 47. To my knowledge, McNeil never uses the term cybernetics.

<sup>21</sup> Those who wish to understand second-order cybernetic principles in a more technical sense or to see how I developed this logic may refer to my doctoral work – Rich Blundell, Department of Modern History, Macquarie University, Sydney, Australia.

<sup>22</sup> Indeed, this would be true of any system – no matter how expansive, subjective, fantastical or mystical it might be – since it would be part of the domains of nature. My commitment to a secular, philosophical naturalism may also help explain why I did not adopt something like that proposed by the French Jesuit and palaeontologist, Pierre Teilhard de Chardin (1881–1955), as in his notion of the *noosphere* (the realm of thought), which is generally regarded as a religious concept, although I do admit it is a powerful notion with many functional similarities and is by-default part of the cybernetic system of nature.

<sup>23</sup> Tom Froese 2011. Unless humans perceive of themselves as embedded in ever-expanding and nested systems, they tend to forget that they are integral components in any system. By acknowledging myself in my own research, it therefore becomes *practice-based research*. My doctoral program also includes two creative-practice projects, a cosmic microwave background experience app and a public lecture series. These are examples of system reflexivity in practice.

<sup>24</sup> N. Katherine Hayles 1999: 8.

<sup>25</sup> Michael Polanyi 2009: 18.

<sup>26</sup> Bruno Latour 2014.

<sup>27</sup> This point is made in current psychological literature and practice. For example, see the theses developed in the following psychology literature. Jill Sinclair Bell 1997. F. Michael Connelly and D. Jean Clandinin 1990; 2006. Cheryl Craig 2003. Julian Kitchen et al. 2011. Joann Phillion and Ming Fang He 2007. Jonathan Smith et al. 2009. Max van Manen 1990.

<sup>28</sup> Dan McAdams 2008: 242.

<sup>29</sup> Antonio Damasio 2000: 10.

<sup>30</sup> Dan McAdams 2008.

<sup>31</sup> Literary scholar John Niles suggests that humans might more aptly be called *Homo narrens*, so as to acknowledge the fundamentality of narrative to the species’ identity. See John Niles 1999.



---

<sup>32</sup> See Dan McAdams 1997.

<sup>33</sup> F. Michael Connelly and D. Jean Clandinin 2006: 477.

<sup>34</sup> ‘Song of Myself’ is Walt Whitman’s most famous work. First published in his 1855 book of poems, *Leaves of Grass*, it was revised extensively, reaching its final form in 1881.

<sup>35</sup> The ancient Greek root of eco (as in ecology and economics) is οἶκος (*oikos*), which translates as ‘home,’ ‘household’ or ‘family dwelling’.

<sup>36</sup> I suspect that, at least in modern, industrial fishing, advances in technologies, such as GPS and depth-sounding equipment, have replaced much of the tacit knowledge involved in traditional tuna fishing.

<sup>37</sup> Horst Bleckmann and Randy Zelick 2009.

<sup>38</sup> It wasn’t until many years later that I came across ecologist Aldo Leopold’s similar story about a wolf, which he describes in ‘Thinking like a Mountain’, an essay in his book, *A Sand County Almanac* (1986). Not surprisingly, his experience resonated deeply with me, evoking a newfound respect for the power of transformative experiences, including my own. Later I would see how much of whom we become is rooted in such sudden and unexpected moments. The same psychological upheaval that transformed Leopold from naïve woodsman into one of America’s most preeminent conservationists manifested might be available in other contexts.

<sup>39</sup> Michael Polanyi 2009: 24.

<sup>40</sup> I also began to glimpse what my historian colleagues were missing. The reference to the ‘two-cultures’ alludes to C.P. Snow’s famous 1959 Rede Lecture, during which he lamented the widening gap between the sciences and humanities. Charles Snow and Stefan Collini 2012.

<sup>41</sup> The prevalence and significance of culturally entrenched conceptual metaphors is documented in an influential thesis developed by George Lakoff and Mark Johnson 2003.

<sup>42</sup> Praxis is an action that embodies a prudent depth of theoretical and conceptual understanding, appreciation for multiplicity of context, and commitment to beneficence.