Being Whole

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I begin by thinking of my friend and mentor Gregory Bateson, but the questions here are broad and relate to the experience of many people, and many kinds of people.

Gregory was known as a great polymath. But that is not quite right. In truth, he was a holomath, if we can coin that word.

A polymath is a person who turns to, and sometimes excels in, multiple fields of endeavor. A holomath is a person who sees multiple fields as being really the same enterprise, circling a central pattern from different angles and points of view.

Parallel Worlds

We usually think of polymaths as people who are at home in separate fields, contributing something to each of them. For example, Geoffrey Keynes was the foremost William Blake scholar of the twentieth century. (In fact, he was put onto Blake in 1905 by Gregory's father, William Bateson, pioneering geneticist and noted art connoisseur—yet another person you couldn't pin down.) Keynes was a major figure of English literary and art criticism and founded the William Blake Trust, which among its many other publications produced gorgeous facsimiles of Blake's multimedia illuminated books that intimately blend poetry and visual art. He also authored works on Jane Austen, John Donne, William Harvey, and more. But in his day job, Keynes was a surgeon. He was knighted in 1955 for his services to medicine. He pioneered new methods of blood transfusion, for the treatment of myasthenia gravis, and most famously for the treatment of breast cancer with limited surgery followed by radiation, which has stood the test of time. Keynes was the classic polymath, pursuing parallel careers in completely different fields.

There are plenty of people like this. David Sulzer is a noted neuroscientist at Columbia, while as Dave Soldier he is an equally noted

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avant-garde violinist and composer. Dexter Holland, leader of the punk-rock band The Offspring, is also a molecular biologist. Last year I read about a woman in California who is a professional ballerina and a NASA rocket scientist. I had forgotten her name (Kelley Hashemi), so when I sat down to write these pages I googled her ("ballerina + rocket scientist") and found at least *four* such women. Three of them are currently alive and working, and the fourth, Judith Love Cohen, danced in the Metropolitan Opera Ballet, was a leading engineer on the Apollo Moon program and later the Hubble Space Telescope, and was the mother of the actor Jack Black.

We have all known, and many of us are, people with multiple skills and multiple knowledges. Such people may not be famous but are committed and capable in multiple fields of endeavor. Our emphasis on famous figures such as Leonardo da Vinci obscures the fact that many people around us are polymaths. The everyday reality of women's lives is that very few women are *not* polymaths.[1]

Keynes on his parallel worlds:

> I wanted to advance British surgery if it were possible and to have a full life, intellectually, aesthetically, and humanly, no matter how hard I had to work. Above all, I wanted the understanding and affection of friends and family. It was asking a great deal of life, but not too much. I had found Blake and his conviction that Imagination was the divine gift to the human race and believed that he was right. The gift must therefore be exercised and appreciated in others to the utmost of one's ability.[2]

Being a Holomath

Gregory Bateson was a different sort of bird. He spent years looking at the social interactions of Indigenous peoples in Papua New Guinea and Bali; he became one of the founders of systems and communication theory; he studied the play of otters, the lives of schizophrenics and their families (as "ethnographer" at a VA mental hospital), studied octopuses, porpoises, artistic practice, religious practice, and addiction; and he became one of the parents of the ecological movement. He was a field researcher, theorist, filmmaker, photographer, writer, and storyteller. In the 1950s he was comfortable teaching the poetry of Blake and e.e. cummings to medical residents in psychiatry and teaching philosophy of science to beatnik students at the San Francisco Art Institute. So what "was" he? The problem is that verb, *was* or *is*. In everyday encounters with people, we are conditioned to use this troublesome word. "I *am* a

software engineer," "I *am* a firefighter," "I *am* a tour guide." But that *am* is only a part of a person.

It is often stated that Bateson "went from" biology *to* anthropology *to* cybernetics *to* psychiatry *to* the study of animal communication *to* ecology *to* philosophy back *to* biology and on *to* the study of aesthetics and religion. The metaphor of "went from" and "to" implies a two-dimensional map. If you visit a university, it *is* its own map—you can walk from psychology building to anthropology building to biology building to art building and so on. They are separated by lawns and pavement. Schools, departments, disciplines. If you are a young undergraduate, you may wander from one building to another, but as you "grow up," you specialize and stay in one place. You "settle down." You might go "interdisciplinary" and make friends with someone on the other side of the lawn and do some work together. Crossing the lawn, you may or may not stop to smell the flowers.

But a map is not the territory.[3] Do the flowers belong in the botany building or, thanks to their inextricable interdependence with pollinating insects and soil-building worms, in the zoology building? Do the flowers' cultural manifestations belong in art or in archaeology? Perhaps in economics if they are descendants of Dutch tulips. Chemistry? Physics? Medicine and cardiology if they are digitalis-foxgloves. You can think of a thousand other examples. The system of separate buildings and disciplines completely breaks down as soon as we examine anything in the real world.

Bateson said,

> It is more than fashionable, it is inculcated by our great universities, who believe that there is such a thing as psychology which is different from sociology, and such a thing as anthropology which is different from both, and such a thing as aesthetics or art criticism which is different from both, and that the world is made of separable items of knowledge in which if you were a student, you could be examined by a series of disconnected questions called true-or-false quizzes, quizbits as you might say. And the first point I want to get over to you is that the world is not like that at *all*.[4]

That attitude is holism: an argument for a liberal education that is diverse and inclusive of many fields of inquiry, many points of view, without bothering with boundaries. But it will spark a counterargument from people who are settled in their specialties and do a great job of it. Go deep: you can't play the violin well unless you fill innumerable days with practice. In 2019 I had open-heart surgery, which turned out perfectly, and I am very glad the surgeon had performed thousands of operations and was deeply specialized in his work. On the other hand,

I am equally glad that his experience gave him awareness of context, peripheral vision, and comfort handling the odd and out-of-the-ordinary events that could arise. When you need a new roof on your house, you want roofers who are expert (experienced), who have practiced the craft hundreds of times, who have seen all the exceptions and odd flukes that intervene in the process—and who know how to do a dangerous job safely. "It's fun to have fun," wrote Dr. Seuss, "but you have to know how."[5] Go back to the flowers on the college campus. We would know little of the interdependence between flowers and insects without the dedicated, concentrated work of specialist entomologists. We would know little of the communication between the roots and the mycelium underground without the passionate dedication of other specialists. But you want the specialist—the musician, the surgeon, the builder—to operate with wisdom and some degree of enlightenment, with some awareness of context and of the interdependent, constantly changing world that surrounds the immediate field of vision. We find ourselves in the dialectic of knowledge versus wisdom. They are different, and we need both.

As an old man, Gregory wrote in a letter to his fellow regents of the University of California: "If you throw away the connection—if you throw away the pattern which connects the items of learning, you destroy all quality in your education."[6] This phrase became shorthand for the key question of his lifework:

> What pattern connects the crab to the lobster and the orchid to the primrose and all the four of them to me? And me to you? And all the six of us to the amoeba in one direction and to the back-ward schizophrenic in another?
>
> I want to tell you why I have been a biologist all my life, what it is that I have been trying to study. What thoughts can I share regarding the total biological world in which we live and have our being? How is it put together?
>
> What now must be said is difficult, appears to be quite empty, and is of very great and deep importance to you and to me. At this historic juncture, I believe it to be important to the survival of the whole biosphere, which you know is threatened.
>
> What is the pattern which connects all the living creatures?[7]

Gregory spoke of wisdom—and beauty—as recognition of the pattern that connects: recognition of the recursive, systemic nature of the world in which we live. Recognition that everything we see or touch is a small part of an immensely interconnected system, which has the characteristics of mind and life.

Looking with a Comparative Eye at Process

A key method throughout Bateson's work is *multiple description*. You can know something only by seeing it from multiple points of view. Two chapters in *Mind and Nature* are titled "Multiple Versions of the World" and "Multiple Versions of Relationship." Two descriptions are better than one. And descriptions will always vary. The simplest case is binocular vision: our two eyes see from different angles and put together a description of the three-dimensional world that is different from, and richer than, what either eye could see alone. "The Sun's light when he unfolds it / Depends on the Organ that beholds it," said Blake, whose influence on Bateson was enormous.[8] "As the eye, such the object."[9] From this statement we can derive the whole enterprise of biosemiotics. Each creature experiences a world dependent on its particular senses—the *umwelt*. How vastly different is the same "thing" seen by a person or a dog, an eagle or a bee! The very concept of "thing"—to which we are so attached with our languages and our nouns—has a great deal to do with the fact that we are creatures with hands and opposable thumbs. We have this wonderful capacity to pick things up and manipulate them, to carry them around and thereby separate them from their contexts. It is a gift but certainly biases our thinking in a certain direction.

"Such was the variation of Time & Space," said Blake, "which vary according as the Organs of Perception vary."[10] Therefore the only way to know the world around us, each other, or ourselves is through multiple descriptions, diverse points of view, using diverse organs of sensation.

Bateson described his method as "looking with a comparative eye at process." He spoke of how important it is to stamp out nouns, to realize that all the forms we see before us are secreted by process, by change, movement, and evolution. And different processes can be similarly shaped. Finding those shapes and their similarities was the essence of his kind of science.

An interviewer from Naropa University asked Gregory about his "career"—his going from tribal cultures in Papua New Guinea to schizophrenia to dolphins to ecology. "Why do you shift?" asks the interviewer. Gregory replied,

> People keep asking me why do you shift from anthropology to porpoises, from schizophrenia to this and that. My answer to that is that I don't shift. I maintain a fairly steady interest in the same set of problems. Sometimes I think these are going to be illustrated with porpoises, and sometimes I think they are going to be illustrated with psychiatric data, or ecology or something else. What I try to do is to study the nature of order—where it can come from and what sort

of business it is. And how the way people think about it makes an enormous difference to the sort of order which they're going to make when they make some, or disorder. Essentially I'm here at Naropa with an interest in how this Buddhist outfit put ideas together, the sort of order they want to make of ideas.[11]

The world does not come subdivided into departments, nor does lived experience. But the left brain does like to divide and organize. Our words, our labels, and the conduct of our professions divide and organize.

Gregory used the word *formal* with some reverence. He was not speaking of *formal* in the sense of wearing a suit rather than a lumberjack shirt but rather of looking at the forms and shapes of the living world, discovering how those forms appear as metapatterns. He coined the word *transcontextual*:

It seems that both those whose life is enriched by transcontextual gifts and those who are impoverished by transcontextual confusions are alike in one respect: for them there is always or often a "double take." A falling leaf, the greeting of a friend, or a "primrose by the river's brim" is not "just that and nothing more."[12]

The formal approach enables us to see the shapes of interaction common to diverse contexts. Here is alcoholism on the one hand, and here is nations' addiction to reflexively "upgrading" their armaments on the other, and the two processes are similarly shaped. "He who would discover for himself what ideas are made of and how ideas combine to make a mind must wander in one or more of these transcontextual mazes."[13]

Gregory was fond of retelling the myth of Tiresias, the blind seer of Homeric Greece. Tiresias was a man who came upon two snakes coupling in sex. In one version of the story, he killed the snakes, and in another he took a stick and pulled them apart. In consequence, he was changed into a woman. Ten years later, the woman Tiresias did the same thing to another pair of coupling snakes and was changed into a man. Still later (since he/she possessed transgender knowledge), Tiresias was brought in to adjudicate an argument raging between Hera and Zeus over who had more fun in sex, men or women. Zeus was adamant that it was women; Hera was adamant that it was men. Tiresias said women had the most fun. Hera was enraged at his response and as a punishment blinded him. Zeus was grateful for the backing and gave Tiresias second sight. Blind, Tiresias had access to extraordinary knowledge because he had experience of both the man's and the woman's points of view.

Tiresias was the embodiment of the Joni Mitchell song: "I've looked at life from both sides now . . . I've looked at love from both sides now."[14] Multiple versions of relationship—this is the holomathic view.

The composer and improviser Pauline Oliveros created the following score:

> Listen inwardly to the sound of your voice.
> Listen inwardly to the sound of your voice changed to the opposite sex.
> Listen inwardly to the sound of both voices together.
> Listen inwardly as if there were many of you.
> Listen inwardly freely as your voices change randomly.
> Express your voices aloud.[15]

Polytropos at Play

As we explore the holomathic view, another luscious word-image is *polytropos*—coined by Homer (whoever she or he was). Turning in many directions. It implies an organism, centered, that can stretch itself this way and that, explore and extend. The first line of the *Odyssey* calls Odysseus *polytropos*—a man of many turns or a man of many ways, as it is usually translated. *Poly* as in multiple, *tropos* as in tropism, the way a plant turns toward the sun. Turning many ways, turning in many directions. In Emily Wilson's translation of the *Odyssey*, she renders polytropos as "a complicated man."[16] *Complicated*—look up the roots of that word—means *to fold together*. We need to cherish and appreciate complexity, not try (as in reductionist science or politics) to cut it out.

To become adept at turning in many directions: this is the opposite of our fixation on *careers*—heading with purpose in one direction without diverging. *Polytropos* brings multiple perspectives, multiple views of reality, multiple views of relationship.

Polytropos—to be capable of twists and turns, seeing things from many perspectives—is a marker of *play*. It is also a marker of those grand play-forms of art: storytelling, theater, photography, music. Play gives you multiple roles and multiple points of view. It lets you see a bit of life from a view that is not yours, from a personality that is not yours. In play children try on different roles. As a child you are not just learning to be a firefighter one day or an astronaut the next day; you learn that there *are* roles and that you can try them on.[17] You can take on multiple ways of being at your choice. That is the lesson of play.[18] To be willing to play creatively, to enter the world of a novel or any work of art, you need to be willing to take on structures that are not *your* structure.[19] (John Cage told me that he wanted to make art that was not self-expression but self-alteration.) This goes back to Bateson's landmark exploration "The Message, 'This is Play.'" Organisms communicate about relation-

ship and changes of relationship. Through play and art, we learn that each being has certain points of view, certain actions that are easy and not so easy. Play is for pleasure and joy, but out of our play-forms can come wisdom and compassion.

To be polytropos is to be to some extent illegitimate.

The word *career* comes from a Latin word for a wheeled vehicle, as in *chariot*. You're on a road going somewhere. People want you to fill out a form with a line some two inches long stating your "Occupation."

That constricted expectation was what Bateson endured to some degree. At a conference in 1973, I met a well-known anthropologist who told me that "Bateson is outside of science." A wonderful review of *Mind and Nature* in the *New York Review of Books* by Stephen Toulmin was called "The Charm of the Scout" and featured a caricatured drawing of a smiling Bateson on horseback. He was pictured as the Old West scout with no fixed abode, exploring where no one has gone before (or rather where many people have gone before, but they've all been weird holomaths like you).

> His achievements have challenged the professional ambitions of academic behavioral scientists in this country to establish self-contained "disciplines" within the human sciences as autonomous and well defined as those in the physical and biological sciences. Again and again, just when the professionals began to get themselves nicely settled, Gregory Bateson reappeared in their midst, with arguments to demonstrate that their theoretical and methodological certainties were uncertain. No wonder many of them have found his work exasperating as well as admirable.[20]

Toulmin writes of "the comparative isolation in which Bateson has lived and worked. Somehow, his background seems to have reinforced his sense that he did not need to 'prove himself': his true colleagues all along have been not his contemporaries but his great precursors down the ages."[21]

Education and Training

Education and training are often confused with each other. Both are important, but they are not the same thing. Education is about being whole. Training is about learning how to do something specific. It is vital to have specific, specialized skills, whether in your job or taking care of your house.

In America we often say *education* when we mean *training*. This is a purely instrumental view of "education." Thus a young person is asked: if you study English literature, geography, African history, and calculus, will they be "worth it?" Will they land you a job that pays more than your college education costs? Do you study these things to get a job or to become a citizen who inhabits this world with some consciousness and conscience? It is essential to live on both sides, now.

If you're a citizen who votes—someone who is not a scientist and not a lawyer—it's valuable to have a basic grasp of science, law, poetry, civics, geography, music, mathematics, and many other things. A criminal defendant is expected to have an idea that his actions were illegal, even if he is not a specialist lawyer. Ignorance of the law does not excuse him from being responsible for a crime. It is valuable to know something about how a car works even if you're not an auto mechanic. That is what education—in schools, in the family, on the street, and simply pursuing one's own curiosity—is for. Simply knowing about multiple fields, having some degree of familiarity with them, is basic to life.

Schools and the workplace are geared to seeing life as separate or separable systems. Bateson's holomathy was about learning—sometimes with great effort—*not* to see life as separate or separable systems. Gregory wanted to give students an exam with two questions: 1) What is entropy? 2) What is a sacrament? To be alive, to be a citizen, to be a person who has gone to school, is to be able to wonder about both of these questions and many more. He said that one needs to learn not only how the systems of our world are interconnected, but also how they are interconnected with our own processes of perception.

Parts of Persons

Visualize a group of people seated around a conference table—academic, business, government. Bateson said that each of us in this context has a tendency to act as a part-person. The table cuts us off below the chest; we are talking heads, and perhaps hands are moving. In teleconferences even more is cut off. On the boards of directors of companies and other institutions, even more is cut off:

> The social scene is nowadays characterized by the existence of a large number of self-maximizing entities which, in law, have something like the status of "persons"—trusts, companies, political parties, unions, commercial and financial agencies, nations, and the like. In biological fact, these entities are precisely not persons and are not even aggregates of whole persons. They are aggregates of parts of persons. When Mr. Smith enters the board room of his company, he is expected to limit his thinking narrowly to the specific purposes of the company or to those of that part of the company which he "represents." Mercifully it is not entirely possible for him to do this and some company decisions are influenced by considerations which spring from wider and wiser parts of the mind. But ideally, Mr. Smith is expected to act as a pure, uncorrected consciousness—a dehumanized creature.[22]

What do we pay attention to? What do we spend our time on? What do we value? What do we ignore? What do we connect to the pattern of our lives and what do we leave out there by itself? What do we notice? What do we like and dislike? In music, in language, in science, in education, in politics, we ask: What is signal? What is noise? What is inside? What is outside? What is a boundary? When is a boundary an interface?

The *math* of polymath or holomath (or mathematics) comes from the Greek *manthanein*, to learn, or *menthere*, to care, with roots in other languages meaning wide-awake or lively.

When we went to school—elementary, junior high, high school—we went hour-to-hour and room-to-room through a travelogue from English to physics to history to math to sports to music to Spanish. This was normal life for a child, though today children are very lucky if their school funds even a portion of these explorations. There were lessons and tests, things that we liked and disliked. Each of us can take quite a journey though these stations, and at the end we are most likely to be presented with a host of metamessages saying that when we grow up we must specialize, pick a profession, make our way, forget the other subjects. Along the way, children are told not to doodle math in their history textbooks.

But no one can force you to forget.

On a trip to England, a group of us participated in a research visit to the Madeley Nursery School, a Reggio Emilia school run by the extraordinary Louise Lowings. The school is built on an open floor plan, big rooms with wide doorways from one to another. In one spot sat a teacher with a microscope with a projection screen, trained on some protozoa and tiny insects and algae. At another station was a math teacher with a pile of large blocks in various geometric and arithmetic patterns. At another station a teacher was reading a story. Outdoors were sports and games and an investigation of the plants and bushes. The children

were free to spend the entire day wandering at will from one place to another. One child spends two minutes with the storytelling and gets bored and leaves, and then spends an hour with the microscope, and then moves on to something else. It's a stochastic process of constant Brownian movement of children, interacting, playing, and learning.

A few days later, with Nora Bateson and other friends, I visited the Cambridge University library, an enormous edifice. We were researching in the archives of Nora's grandfather, William Bateson. The archives were located in a room off another room off another room. After a while I needed to use the bathroom, so I had to wander through many rooms and corridors to find it. On the way, I was passing hundreds of thousands of books, my eyes glancing over a few of the spines, sometimes making a little detour, sometimes rushing on past. And then a return trip. There was a powerful message from all those books, delivered just by their physical presence. This message is something that can only be conveyed in a real, physical library that you walk through, not on the internet. In a lifetime I could read or skim or glance at only the tiniest microscopic iota of all those books, and the vast majority of those books are on subjects that I would never care about. If I were to stop and pick them up, most might seem boring or incomprehensible. But all of this immensity of *manthanein* exists, and I am dwarfed by it. It is so comforting to know that all this exists in the world. We can have the same experience in a gargantuan research library or a local community library or a real, physical bookstore. To be cocooned in awareness of all that we don't know!

Hallelujah

In the holomathic Bateson way, we can come to an understanding of the world, whether in science or in art, only by having multiple views of the world, multiple views of relationship, which can intersect and give birth to something new.

Arthur Koestler, writing in the 1960s on a different but parallel track to Bateson, said that the hallmark of creativity in art and science (and in humor) is *bisociation*—one rubs together two previously separated realms to come up with a new synthesis, unexpected but meaningful. Koestler's idea drew from, and applied to, three realms of creativity: jokes and humor, artistic creation, and scientific creation.[23] All three realms are marked by the explosive coming-together of seemingly different contexts. In artistic creativity, the same point of light, the same sound, the same word, appears in multiple contexts from different views.

Transcontextual—you have to know two different frames of reference and be able to combine them and see them as instances of a bigger pattern.

You don't need to be a holomath in your outer life or job, but there are moments where it all comes together. That stock phrase "it all comes together" tells us that now, today, for this moment, we are being whole. A moment of creating a song, hearing a song, reading a paragraph in a book that opens our eyes to connections. The glint of multiple memories that fuse in us as we watch the sunlight reflected on the roof of a moving bus below our window. Moments of *kensho*, as they say in Japanese Zen.

Creative acts involve multiple relationships and multiple visions of relationship—the intersection of contexts. In Leonard Cohen's "Hallelujah," one word converges whole realms of experience. "Hallelujah" arises from the bisociation, more than bi—of King David the improvisational singer finding intervals rising and falling and rising until the string instrument vibrates with bliss—of the joy of opening to the mystical beauty of god and really deeply connecting with that god, hallelujah!—of a man and woman being inside each other moving, moving in the warmth and joy and coming, hallelujah!—of Cohen's joy in writing a few good words that fit together and catalyze—hallelujah! There have been attempts to cut the song to have fewer connections (or to be less racy), but they were not very good. It is the whole package of associations, the willingness to feel them all at once, that makes the song great.

Who's an Artist?

I have sometimes visited schools to talk about music and art, or to instigate musical improvisation activities. I've noticed a sharp difference between first graders and sixth graders. In a class of first graders I ask, "Who's an artist here?" All the kids raise their hands. In a class of sixth graders I ask, "Who's an artist here?" All the kids swivel around and point at one kid. He or she is the identified artist, and the others are not.

What tacit lesson was taught in between those grades?

This experience is reminiscent of e.e.cummings's "As up I grew, down I forgot."[24] Making art, building things, investigating nature, singing, telling stories, playing with mathematics—all these are part of our universal inheritance as complete human beings. Then a grid is laid upon us.

Much world mythology addresses the theme of lost wholeness. There are many myths that tell of the giant out of whose body the world is made: Finn of *Finnegans Wake*, Adam Kadmon of the Kabbalah, Ymir of the Norse myths, Purusha of the Hindu myths, the Giant Albion of William Blake. The so-called Fall is this giant falling and fractionating

into billions of bits, which are us and our fellow organisms and all the inorganic bits of the universe. So too the myth of Babel. Occasionally, we—the separated bits—get intimations that we are part of something bigger, something integrated, a whole organism. Today, in the midst of accelerating ecological degradation, we have the Gaia hypothesis. She is Finn-again. We must realize that we are part of something whole—or die.

We regard as "protean" figures those people who seem to change shape and adapt to multiple contexts. *Proteus* from first, primordial or firstborn. *Amoeba proteus*, the most well-known species of protozoan, is named after the Greek demigod Proteus because it can move in any direction, even in two directions simultaneously. Its shape is constantly shifting. As a teenager, I made film studies of the social behavior of protozoa.[25] Protozoa are polymaths. I found it fascinating that, as one cell, they hunt, digest, move, reproduce, sense—all the activities that require specialized organs in "higher" animals are done by this one cell.

Look for videos—they are easy to find—about the incredible displays of bowerbirds in Australia and Papua New Guinea. These birds build elaborate multilevel architectural structures and decorate them colorfully with leaves and debris and various pigments in the environment; they sing and dance around them, doing ritualized (but always a bit new and different each time) theatrical displays. It would be foolish of us to separate these into departments the way we do in universities and performing arts centers. It is all one activity—*Gesamtkunstwerk* as the Germans call it, an idea used by John Ruskin, William Morris, Richard Wagner, and other artists.

Bowerbirds can weave into their vocalizations realistic imitations of other birds and animals, environmental noises, and human noises such as car alarms and chainsaws. In these immensely complex displays, created and sustained over many weeks, bowerbirds are doing music, dance, sculpture, architecture, and theater. These are not separate systems.

Lest They Become Empty-headed

My favorite story about Gregory's childhood, which tells so much about his approach to life and science—and education—reflects his sense of multiple versions of the world. His father, William, the biologist who coined the word *genetics*, proudly described himself as a fifth-generation unbaptized atheist. This while being a don at nineteenth-century Cambridge, where church and academia were still intertwined. William expected his sons to become scientists, and atheists. But he read the Bible to them at the breakfast table, "lest they become *empty-headed* atheists."

To really examine any phenomenon—a patch of moss by the side of the trail, a book, a piece of music, your heartbeat—you must learn to see beyond defined identities and become active on a thousand channels of communication, change, evolution—you must experience interdependence. The moss doesn't exist by itself but in a network of relationship. The book has ancestors, descendants, relationships and affinities of all sorts, even with the politician who has not read it but wants to burn it. The book has symbols and images with long lineages, but also ink, cellulose, varnish, many substances—and these were made by people with immensely various lives, loves, labor relations. Very deep is the well of the past, says Thomas Mann.[26] Every object you touch is a nexus of stories. Buddhists speak of this fact as emptiness of inherent existence. The moss, the book, the music, and the heartbeat are empty of any inherent, independent, separate existence all by themselves as "things." The moss, the book, the music, and the heartbeat are full of infinitely many stories, full of interdependent relationship and coevolution.

If you're a holomath, you will search out the patterns of interconnection: from moss to ecology to poetry. If you're an expert, you may spend years looking at and understanding the sporangium of the moss. Fortunately, people come in a wide variety of personality types, so humanity as a whole can benefit from all these kinds of knowledge and their infinite interplay.

In a world where we face interlocking existential perils, we can't afford *not* to think about science, not to think about art, not to think about education, the law, the crafts, technology, literature, religion, or language. Our thesis is that it is vital—for survival!—to recognize that we are whole persons who are parts of larger wholes. As the systems theorist Stafford Beer said, a viable system contains viable systems and is part of viable systems. The reality of living systems (organisms, families, societies, businesses, nations, ecologies) is recursive. This whole-systems view is consonant with Buddhist understanding—Indra's Net and interdependence. To pretend that one is a self-contained identity with a fixed boundary is illusion.[27] Life is networked and relational.

We can't properly understand the world, or anything in it, unless we have at least some understanding of it as a whole. We can't properly know ourselves unless we know the whole. Our work, as humans, is being whole.

NOTES

Thanks for great discussions on these issues to Leslie Blackhall, Angelina Castellini, and Chip Tucker. All statements from Gregory Bateson that are not footnoted are things he said to me or in my presence.

1 Mary Catherine Bateson, *Composing a Life* (New York: Atlantic Monthly Press, 1989).
2 Geoffrey Keynes, *The Gates of Memory* (Oxford: Oxford Univ. Press, 1981), 221.
3 Alfred Korzybski, *Science and Sanity: An Introduction to Non-Aristotelian Systems and General Semantics* (Lancaster, PA: The International Non-Aristotelian Library, 1933).
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